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[OFFICIAL CIRCULAR.]

Iowa Gas Association.

By invitation of Mr. A. T. Averill, of the Cedar Rapids Gas Company, the following gentlemen met at the Grand Hotel, in Cedar Rapids, on December 17, 1884, to consider the propriety of organizing for the mutual advantage of the gas interests of this State:

W. A. Agard	Des Moines.
A. T. Averill	Cedar Rapids.
J. B. Howard	Dubuque.
C. Weare	Marshalltown.
L. H. Ellsworth	Ottumwa.
J. N. Coldron	Iowa City.
C. L. Williams	Cedar Rapids.
—. Moore	Fairfield.
—. Bowen	Oskaloosa.
R. Spencer	Burlington.

Omitting details—the question was fully considered, and it was unanimously agreed that we organize under the name of the "Iowa Gas Association," which was done by electing R. Spencer, of Burlington, President, and C. L. Williams, of Cedar Rapids, Secretary.

It was also decided to hold the next meeting at Burlington, on the third Wednesday (16th) of September, 1885, and the President was directed to give notice to the gas men of the State, cordially inviting all to attend and co-operate with us in this desirable undertaking.

In accordance with the above, the undersigned has issued this and the inclosed circular of invitation, and has sent copies of the same to such addresses as could be obtained.

We should be glad if persons receiving this circular would, in answering, give names of those in their neighboring towns who may not be known to us, to the end that none may fail to receive invitations.

Respectfully,

R. SPENCER, President.

LETTER OF INVITATION.

BURLINGTON, IOWA, July, 1885.

MR.....

....

DEAR SIR:—You are hereby cordially invited to meet your brethren of the gas fraternity of the State of Iowa, at Burlington, on the third Wednesday (16th) of September, next, to complete the organization of the Iowa Gas Association, to confer together upon matters of interest connected with the gas business in this State, and to promote a more intimate acquaintance and fraternal relationship than has heretofore existed among us.

The meeting will be organized at 10 o'clock A.M., at the Barret House, where provision has been made for the accommodation of all.

Please be good enough to indicate by letter, addressed to the undersigned at an early date, of the acceptance of this invitation.

R. SPENCER, President.

ELECTRIC LIGHTING AT LAWRENCE, MASS.

Edison and his followers are in their element when trying to carry out some scheme the distinguishing feature of which is its novelty; that it has or has not any inherent worth is of no consideration; that it possesses any value to mankind, or be totally void in this regard, or whether the carrying out of the scheme will be remunerative in a commercial sense, are matters of no importance so long as the scheme has the charm of novelty. How many exemplifications of this statement do we find in the history of the many enterprises emanating from the "magician" of Menlo Park. Let one example suffice—the scheme of lighting New York city by the incandescent lights from central stations. That the idea appeared on the face of it to be without commercial value was, in the opinions of the Edisonians, of no moment when contrasted with the extreme novelty of the scheme; so one central station was established, but we do not see that anyone has been benefited by the enterprise.

The latest illustration of the Edisonian love for the novel and the marvelous comes to us from the thriving city of Lawrence, Mass., where there is a company engaged in lighting some of the stores and buildings on the main street, by the Edison lamps, fed from a central station. The latest craze consists of a proposition made by this company to the city government to do all the lighting of the public lamps, both gas and oil, by the incandescent electric lamps. Was there ever anything so charmingly unique as this idea? Heretofore sane men have argued that as the arc light was cheaper than the glow lamps, and as gas was less expensive than the former, it naturally followed that the incandescent lamp was dearer than gas. But the disciples of Edison are above such common sense considerations as these, hence their proposition to illuminate the streets of Lawrence. In their letter to the Board of Aldermen they proposed to replace all the gas and oil lamps throughout the city—about 500 in all—with the electric light, and to supply the current to the same; one hundred of them to be kept lit all night, the balance till 11 o'clock, for the sum of $650 a month.

At the hearing on this matter before the City Council the agent of the electric light company dwelt upon the novelty of the plan. The street lamps would be divided into six circuits, each one of which would be lighted and extinguished instantly from the central station; so, in case of a fire occurring in any part of the city after eleven o'clock, the lights in that section could be turned on immediately; or in case of a riot, the streets could be illuminated at once. Further, the streets would be much more brilliant if the electric light were used, according to the witness, and the process of reasoning by which this point was established (?) was decidedly Edisonian; for the gentleman argued as the State law requires gas companies to make gas of 15-candle power when burned from an Argand burner; therefore four feet of gas consumed through a batswing burner would give a light of eight and three-fourths-candles.

On cross-examination by the counsel of the gas company the witness admitted that he had not obtained his information on this point from personal experiments, but had acquired his knowledge from his general reading. He also admitted that the wires to the electric lights would be on the overhead system—that is, stretched on poles. He likewise, in answer to further questions, stated that it would take about thirty miles of wire to reach all the lamps. He was then questioned sharply as to the purposes of the company—if it were not their intention as soon as the wires were stretched through the streets to use them for lighting houses, but he insisted that was no part of their plan, as the street lighting system was not applicable to interior illumination. In continuation, he asserted that not even the poles could be used for the purpose of carrying wires for house lighting requirements, as they were not heavy enough. For the street lighting system only one wire is necessary, as the high current is employed, but several wires are required for inside lighting.

In answer to another question he was, and with a sorrowfully reluctant manner, compelled to admit that the system was not in use anywhere in New England; but immediately sought to soften the asperity of that confession by stating that "a town in Maryland" had adopted it, and the Lockport (N. Y.) gas company used it for lighting the lamps in the suburbs, or in those situations not reached by the gas mains

One of the directors of the Edison Company then took the stand and held forth on the darkness of the streets at night, by reason of the lamps not being lighted when the moon was shining according to the almanac, but was actually obscured by clouds; and also on account of the dirty condition of the globes and lanterns.

Mr. Humphreys, the agent of the gas company, then took the stand, and quickly demolished the former witnesses' testimony on the amount of light to be obtained from four feet of gas. Mr. Humphreys stated that his company did not hide behind the State law and supply a 15-candle gas, but sold a gas of from 18½ to 19½ candles; and therefore four feet of gas would give a light of over 15 candles instead of 8¾ candles.

Mr. Humphreys explained fully that his company was in no wise responsible for the poor lighting of the thoroughfares, as the care of the lamps was entirely in the hands of the city, who lit and extinguished the lamps at their own pleasure, and cleaned or failed to clean the glass and burners. These were matters which were entirely beyond the control of the gas company; all that the latter did was to supply the gas to the lamps; the time of lighting and putting out was under the control of the street commissioner, who at the end of each month rendered the gas company a memorandum of the number of hours the lamps were lighted, and from this statement the bills for the gas used by the lamps were made out. Thus the entire matter of lighting was in the hands of the city, and if the work had not been properly performed the city had no one but itself to blame.

Mr. Humphreys also called attention to the fact that the gas company had frequently endeavored to get the city to adopt some better system for lighting and caring for the gas lamps, but without success.

Mr. Humphreys also exploded the theory, advanced by the Edisonians, that the adoption of the electric light would be of benefit to the city from a pecuniary standpoint, by showing that heretofore the main expense of the lighting department was for labor, etc., and not for the gas itself; that of the $9,000 expended by the department last year the gas company received only about $3,500. This matter of attendance, in Mr. Humphreys' opinion, cost the city too much; and to show that he had the courage of his opinion, he submitted a formal proposition to the City Council, to the effect that the gas company would light and take entire charge of all the gas and oil lamps throughout the city, do all the lighting and extinguishing, and make all repairs, for the sum of $500 per month. Consequently the proposition of the electric light company, instead of resulting in a saving to the city, if accepted, would be an actual extravagance; for by the proposition of the gas company the latter would supply a better illumination than that furnished by the electric light folks, at a saving to the city of $1,800 per year.

However, the love for the new and marvelous had extended to the Council; for, though every point advanced by the electric people was fully met by the evidence of Mr. Humphreys, yet the authorities, on the very evening of the hearing—without so much as sleeping on the proposition of the gas company—accepted the offer of the Edison Company, which was, as before stated, to do the street lighting for $650 per month, the contract to run for five years.

The Edison people have not yet, we understand, commenced the erection of the posts, and we do not think anyone will be benefited if they do commence, unless it be some stockholder who may take advantage of the occasion to get from under.

A DISASTROUS PLEASURE TRIP.

At about half past four o'clock on the afternoon of Sunday, July 12th, the steam pleasure yacht Minnie Cook, while cruising on Lake Minnetonka, Minn., was overtaken by a severe storm of wind and rain. The yacht was overturned, and her occupants (with one exception) lost their lives. The persons comprising the ill-fated party consisted of Mr. and Mrs. A. C. Rand, their sons, Harvey and Frank (the former succeeded in reaching shore), Mr. and Mrs. Jno. R. Coykendall, Miss Kate Coykendall, and Geo. McDonald—the last named was the engineer in charge of the pleasure boat. Mr. A. C. Rand was well known to the gas fraternity of this country, his principal fame arising from his connection with the largely-advertised patented process of gas manufacture yclept the Gale and Rand. It will be remembered that this system attracted much attention at the hands of American gas engineers some twelve or fifteen years ago, and although its claimed merit was subsequently shown to be but vague, it is matter of common understanding that its monetary value to Messrs. Gale and Rand was eminently substantial.

After disposing of his interest in the above-named patented rights, Mr. Rand became connected with the Minneapolis (Minn.) Gas Light Company—the exact date of his accession to that company is unknown to us, save that it occurred between the years of 1875 and '78—acting as President and Treasurer of the corporation. Subsequently Mr. H. W. Brown was made Treasurer, Mr. Rand, as before, occupying the presidential chair. Deceased was a very popular citizen of Minneapolis, and served two terms as Mayor of that city. He was genial in manner, and had the happy knack of making friends and keeping them; but as honest chroniclers of gas history we are obliged to record that much of the present piracy in the business of gas manufacture may be traced back to him; for it was his fertile brain that originated the scheme of offering a gas company the choice of purchasing the patent rights, or else taking the chances presented by an opposition war of rates. The best evidence we can give regarding the intrinsic worth of the Gale and Rand patents is submitted when we call attention to the fact that coal gas is and has been made at Minneapolis. Be that as it may, the dreadful accident that brought such disaster to the Rand household cannot fail to arouse the most sincere regret, and friend and foe will alike join in tendering sympathy to the survivors of that afflicted family.

[Official Report—Continued from page 36.]

Eighth Annual Meeting of the Western Gas Association.

Held at the Tremont House, Chicago, Ills., May 13, 14, and 15, 1885.

Second Day—Morning Session.

The President's gavel rapped for order at 9:30 o'clock on morning of second day (Thursday, May 14), and proceedings were commenced by the presentation of Secretary and Treasurer's annual report, which was as follows:

Treasurer's Report.

Receipts.

To balance from 1884	$272 05	
" annual dues	327 00	
" initiation fees	175 00	
		$774 05

Expenditures.

By Secretary's salary	$250 00	
" stenographic report proceedings Seventh Annual Meeting	162 50	
" printing of bye-laws (250 copies)	31 50	
" membership, etc., badges	36 55	
" miscellaneous printing, stationery, supplies, expressage, postage, etc.	35 00	
		$515 55
Balance on hand May 1, 1885		258 50
Total		$774 05

Mr. J. B. Howard, on behalf of Auditing Committee, reported that the Treasurer's statement and vouchers therefor had been duly audited; the accounts had been rendered in proper order, and everything relating to the duties of Mr. Littleton's dual office were found in perfect condition. On motion, the report (as also the certification of Auditing Committee) was accepted and filed.

In the Matter of Annual Banquets.

Mr. G. A. Hyde, Sr., offered the following:

Resolved, That while we present our most hearty thanks to our friends and associates in the different cities in which we have held our past conventions, for their great courtesy in providing bountiful banquets for the gratification of the inner man, we feel that the practice imposes upon them an excessive expense, and for which they receive no adequate return. As we meet expressly for mutual interchange of practical experience on subjects pertaining to our business, and not for feasting, therefore be it further

Resolved, That we do most earnestly and positively request that in the future the banquet feature of our meetings be omitted.

The mover of the resolution thus further explained himself: With reference to this topic, speaking for myself, I hope the present banqueting system be done away with. As the resolution states, the feature is the cause of unnecessary expense to our entertainers; and if the members must have a banquet let them be assessed so much per plate for it. I am opposed to the idea of banquets at these annual gatherings.

Mr. Spencer, of Burlington, Iowa, seconded the resolutions, and the discussion now became general. Mr. Scofield favored the resolutions; Messrs. Howard, H. E. Clarke, T. Smith, H. Pratt, W. McDonald, the Chairman, G. G. Ramsdell, and E. J. King were decidedly in favor of the annual banquet, although the greater number of these speakers thought the annual entertainment should be given by the Association itself. Mr. Pratt offered, as an amendment to the original resolutions, the following:

Resolved, That while the Western Gas Association appreciates and desires to continue the good effects of the social features of the annual meeting, it is its opinion that hereafter they should be at the expense of the Association.

Mr. Pratt, continuing, said: That resolution will effectually do away with the objection urged by some of the speakers, while at the same time it will not prevent our annual social gathering.

The President—Does Mr. Hyde accept that as a substitute for his resolution, or does he prefer that it should be treated as an amendment?

Mr. Hyde—Personally I have no objection; I simply desired to bring the matter before the Convention.

The President—Then I will put the question as an amendment to the original resolution.

A vote was taken, and the President declared that he was unable to determine the result. A division was then called for. Before roll call could be proceeded with Mr. Spencer moved that the entire question be tabled. The motion was carried without a dissenting voice.

Report of Committee on the Formation of Gas Commissions.

The President—We will now listen to a report from the committee appointed to consider the topic of "gas commissions."

Mr. E. J. King, of Jacksonville, Ills., then read the following report:

Your committee beg leave to report, and respectfully recommend, that the President, before final adjournment, be empowered to appoint a committee of three, whose duty it shall be to as thoroughly as possible investigate this subject, and report their conclusions thereon at the next annual meeting. We deem this matter of such importance as to demand more careful and serious investigation than can be given it at this meeting.

E. J. King,
G. G. Ramsdell,
Carroll Collins,
G. A. Hyde, Sr.,
Z. T. F. Runner,
} Committee.

On motion, the report was received and the contained recommendations adopted.

The President subsequently named the following gentlemen as the members to compose the special committee of three: Messrs. Samuel Prichitt, Nashville, Tenn.; Geo. G. Ramsdell, Vincennes, Ind.; and T. A. Cosgrove, Evanston, Ills.

Mr. Edward Lindsley, of Cleveland, Ohio, then claimed the attention of the Association with a reading of the following paper, entitled—

Success in the Gas Business—Amenity a Requisite.

Mr. President and Gentlemen of the Association:—It has been frequently and broadly stated that the dividends of a gas enterprise are made in the retort house; and it is presumed that no one competent to appreciate the force of the remark will deny the necessity for exercising the utmost care in the conduct of this initiatory department of the business, or fail to recognize the need for similar care in the after processes, even to the final delivery of the main product through the consumer's meter, nor forget to bestow such consideration upon the bye-products as the circumstances in individual cases may warrant.

It has been the writer's good fortune, while attending the sessions of this and other gas associations, to listen to the reading of many valuable practical papers, and of often hearing the no less valuable discussion which followed; while after-reflection upon both has frequently provoked still further elaboration of the ideas then presented.

It is hoped, however, that it will not be construed as an adverse criticism if the thought is indulged that, to a listener unacquainted with the details of our profession, it might almost appear that upon the details of manufacture and distribution (mechanical, scientific, and otherwise) mainly depend the successes of gas enterprises. That these are matters of the gravest importance, and that in proportion to neglect thereof is success imperiled, none will attempt to deny. But, on the other hand, it has been forcibly suggested to the writer—and probably to all present—that, with every detail of manufacture and distribution carefully carried out, there still remains a something beyond upon which largely depends *complete* success. May I call it *amenity*—which Webster defines as "the quality of being pleasant or agreeable, whether in respect to situation, climate, manners, or disposition."

May I inquire—Is it not the very essence of that highly desirable qualification of the business man, known as a good address, which to its possessor is a key to the grace, goodwill, favor, and confidence of his fellows, opening up to him what would be otherwise, or without it, the closed door to success? As a factor of success in our business does it not embrace the idea of the necessity of a proper relation between the company and the consumer—each toward the other, and without which the highest success may not be achieved?

It is not at all in the mind of the writer to attempt the presentation of any radically new idea in this connection; but it is recognized that many commonplace, yet essential, matters often fail of the consideration their importance demands, by virtue of the fact that they are so familiar—and this suggests my apology, if it be necessary to make one, for presuming to present so commonplace a subject for your consideration. Permit me, then, the question, "What sometimes is, and, on the other hand, what ought to be, the attitude of the company and consumer towards each other; and how shall the latter be attained?"

As a preface to the consideration of the first part of our tripartite question, it may be said that gas, from being a luxury, has become almost a necessity where its use is at all attainable; and from being an expensive article it has become, comparatively and almost universally, cheap, with a tendency to become still cheaper. A more thoroughly convenient thing could hardly be imagined for the uses to which it has been applied. Yet, in a sense, this very convenience works to its disadvantage. The minimum of physical exertion and a friction match, or the weight of a finger upon a button and the electric spark, serve to ignite it when wanted, while still less effort extin-

guishes a jet when its use is no longer demanded. Slight as it is, for some reason (or want of reason), that effort is not always put forth, and the gas remains alight to serve no useful purpose. True, a well lighted room is more cheerful to return to than a dark one; and it is easy to say to one's self, "I shall be gone but a moment;" but while that may do for one's self, the average servant is, as a rule, oblivious of the fact that gas costs anything. These are considerations, however, that exert a marked influence on the general aggregate of the bill. A worn out burner or broken tip may still pass gas, and more than enough to serve for an economical illumination. Gas is usually delivered at a moderate pressure, so that a bit of string, putty, or hard soap, which are almost always at hand, is made to serve permanently in closing a leak in pipe or fixture.

We might go on at greater length in suggesting makeshift devices that might be, and often are, used, with the original design of temporarily bridging over a defect; but which in fact become a permanent repair, operating to the manifest financial disadvantage of the consumer, and to the great discredit of the company.

Then the meter, that cabalistic device which, according to *The Judge*, of Feb. 21, 1885, "So inexorably registers so many thousand feet, which is a fixed quantity immutable as a law of nature, and probably regulated beforehand by the gas company, on a system dependent on the number of burners in the house, no matter whether they be lighted or not, is a mystery to most consumers, and a source of anguish to all." Very few care to undertake the solution of so intricate a problem as reading the index, and still fewer are persuaded to understand its admirable construction. The most charitable regard it with more or less incredulity and aversion; while not a few declare, and apparently believe, it to be the champion liar, conceived in sin and brought forth in iniquity. To the ordinary observer the physical characteristics of illuminating gas are pretty well indicated by the word *evanescence*. It can neither be weighed nor measured by ordinary methods, and in its pure and natural state appeals to no sense save that of smell. Unlike most other articles of merchandise, it is, to the average consumer, almost an intangible myth. What wonder, then, that one not an expert in gas matters sometimes finds it hard to realize that the proper ratio exists between the figures presented in his bill and the service rendered—which those figures represent. And correspondingly easy to jump to the conclusion that it is quite the correct and proper thing to denounce the gas company as a fraud, a cheat, and a rapacious monopoly withal.

Does the foregoing suggest an overdrawn picture of the relations existing betwixt some consumers and the gas company that serves them? And if not, are they desirable to either party; or calculated to promote the comfort of one or the profit of the other? And again—if not, how shall the proper attitude of each toward the other be attained and maintained? Will not the exercise of those qualities, which Webster gives when defining amenity, tend toward the attainment of the desired end; and work correspondingly to the comfort of the one party and the profit of the other?

In illustration of our idea, let us suppose a case which we know may occur, and which possibly does occur oftener than we do know: The index taker records a meter statement 1,000 feet too great or too small, and a bill is presented in accord therewith. The discrepancy may be a glaring one, riveting the consumer's attention, arousing his distrust and ire at once, while the man who made it, with perhaps hundreds of others for the corresponding period, may easily fail to observe even the possibility of a mistake.

Now, if that consumer happened to be a man with certain peculiarities of temperament, he may appear at the company's office in the shape of a difficult and unpleasant problem to solve. Fire may be in his eye; his general demeanor beligerent, while bitter invective may characterize his speech; and, in short, he may be wholly unreasonable until he experiences a change of heart. Of course the sooner this change can be wrought the better; but in some cases, and probably in this, it will be best to make haste slowly. Let the man at the desk "in patience possess his soul," and listen quietly and attentively to the recital of grievance, both real and imaginary. By so doing surplus steam will most likely be blown off without danger of explosion, the aggrieved party meantime becoming amenable to reason.

If, as supposed, it is a case of simple error in indexing, ninety-nine men in a hundred will, under such management, soon come to a frame of mind capable of appreciating that a mistake need not of necessity be a capital offense; and that in the case supposed the mistake effects nothing more than payment in advance, or an extension of credit, according to the direction in which the error was made. Heat, anger and impatience are generally unreasonable, and if met by similar qualities, a proper understanding in case of difference is very slowly, if ever, effected. Add to these want of intelligence, or downright ignorance, and the difficulties of adjustment become almost hopeless—especially so if a cloud of obscurity surround the case. And who of us have not at one time or another come in contact with cases that, at first, seemed wholly unexplainable—indeed almost analogous to that oft-repeated tale where the meter cock was closed on index day, and kerosene installed as an illuminant for the succeeding month—but with an undiminished gas bill at the end.

May I indulge in one little reminiscence? Some years since a customer of the People's Gas Light Company, of Cleveland, Ohio, entered the office and announced that his house would be closed for a time (as his family were to take a summer trip), and desired that the index be taken. It being but a short distance from the office the customer waited for the index return, and paid the bill, saying, as he departed, that he would call and have the meter indexed again when the family returned, "as he had little confidence in the thing."

True to his word he called again in five or six weeks, handed the secretary the key to his house, with the request that the meter be indexed, as the family would be home in the morning. The secretary's remark that he supposed the meter cock was closed availed nothing. The index must be, and was, taken. The customer remained at the office until the messenger returned.

A comparison of the readings and the usual mathematical calculations revealed a bill, as my memory goes, of some ten or twelve dollars—gas was $3.00 per thousand at the time. The explosion and tirade that promptly followed I shall not attempt to describe; sufficient to say for a moment the secretary had little to utter, and being young in the business, hardly knew what to think. Finally that official proposed a personal visit of inspection; whereupon the two repaired to the house together—one reflecting, and the other talking until they stood before the meter. The secretary gazed anxiously at the dial—the other waited and fumed impatiently, indulging the while in sarcastic and derogatory remarks. Said the secretary: "It moves." Said the consumer: "Of course it does; that's what it was made for." Said the secretary: "Gas must be escaping." Said the consumer: "Then we ought to smell it."

A careful search of the lower part of the house revealed nothing. They ascended the rear staircase—passing through a hall, an ordinary looking glass was observed through a door opening into an adjoining room. In that mirror was the reflection of a burning gas jet. That room was occupied by the servant girl, and she locked the house when the family left it.

This case, with slightly varying conditions at the last, might never have been satisfactorily explained. But, as a rule, will not patient, careful investigation disclose the cause of seeming discrepancies? I think so; and would respectfully suggest—it is not enough that in justice to ourselves and our customers we pass into our mains gas of a high standard in quality, and deliver it by a nicely adjusted pressure, in fair and honest measure. It is our consumer's right to feel assured that we do this, and it is for us to give the assurance.

Does he manifest a doubting or incredulous spirit, presume not to satisfy him with impatient words or gestures of ridicule. We ought to know more than he of the intricacies of this business; and if he show never so slight a desire for information, it should be both our duty and privilege to impart to him, pleasantly and agreeably, both in manner and disposition, the knowledge that he asks, and by so doing realize the surest way to make him our friend, and an added element of success to our business, from the practice of the virtues and beauties of amenity.

Discussion.

The President—If any of the gentlemen here are disposed to take issue with Mr. Lindsley, we would like to hear from them.

Mr. Jenkins—I do not care to take issue with him; but I do say I think this is about the most important subject we have yet had brought up before the meeting; and it has especial value to the superintendents from the small towns. I believe that if a superintendent of a small works can make himself thoroughly agreeable, and treat his customers in the way suggested by the writer, the outcome of the policy would pretty nearly equal anything he could do in his retort house. I have found that out as the result of experience. I am confident that one must follow the Lindsley plan if he would secure and keep the good will of his customers. As a matter of common policy it is profitable to adhere to his advice. Let me relate a case of my own. One of my customers, a clever woman, too, was very much put out through a failure in the gas supply on an evening when she particularly desired to illuminate her house. Unfortunately she sent me word on the next morning, and not at the time of the failure. I did not go to the house myself, as I learned she was not in very good humor, but sent a man to remedy the stoppage, which was caused by a very simple matter. About a week afterwards I called, as usual, to take the meter. While at the house I met the mistress of the mansion, talked to her very pleasantly, asked her about the children's health, and so on, showed her the meter statement—this we usually do—and, to sum it all up, had quite a pleasant little conversation. I did not hear a word about the anticipated "lecture." A mutual friend who shortly afterwards called at the house told me that she said, "I had a first-rate lecture prepared for Jenkins; but when he came in he was so agreeable I could not say anything about it." That style of procedure will be success-

ful nine times out of ten. I think Mr. Lindsley's suggestion in regard to the treatment of irate customers when they come to the office is a great "card."

Mr. James Somerville—I take some issue with friend Lindsley. I do not understand how it was when that gentleman came over to the gas office and told them to come and take the meter index that the inspector did not shut the gas off at the meter. The entire after trouble would have been obviated had that course been taken. Nine consumers out of ten do not know that they have a certain and easy means of controlling pressure at their meters, and this is where half the trouble comes. Did they understand that the control of the pressure was in their own hands, and that they could regulate it as they saw fit, I think it would be better for all of us. Doubling of pressure means doubling of gas bills. I will take this opportunity of saying to the superintendents of small works—impress upon the minds of your consumers that they can turn the gas off and on at their own will and pleasure. The gas company has nothing to do with it; it is in their own hands.

Mr. Lindsley—I will add a word in reference to the point made by Mr. Somerville, that at the time the occurrence took place the managers of the People's Gas Light Company were all very young in the business. Of course, if the meter cock had been closed there would have been no trouble. I quite agree with Mr. Somerville's suggestion that it is a good point to have a consumer understand how to close and open the meter cock at will. I hold that we cannot take too much pains to give information to our consumers, so far as they are willing to learn, in respect to the ordinary working and principle of the gas meter.

Mr. T. G. Foster—I would like to ask a question as to the policy or propriety of allowing the index taker to give the consumer a statement concerning the gas consumed for the month—*i. e.*, while the index taker is making his usual round. The reason I ask the question is that I have tried that plan, and I find it creates a good deal of dissatisfaction, simply from the fact that the index taker, in his hurry to get through with his work, will sometimes, and as consequence of his hurry, make a mistake in repeating the figures. Suppose the indexer tells the consumer that he has burned 1,000 cubic feet, and when the consumer gets his bill from the office he finds that he is charged with 1,500 cubic feet, this discrepancy naturally impresses the consumer with the belief that there is something wrong, when in reality did the indexer state the case properly the amounts would tally. I think it is alwas best to refer the consumer to the office for a statement of gas used.

Mr. Lindsley—In reply to Mr. Foster I would say, speaking from personal experience in regard to that matter, that the proper place for a consumer to find out the amount of his bill is at the office of the gas company. We have never yet been successful in securing the services of an indexer who was able to do much more than record, in a mechanical or perfunctory way, the figures as he found them indicated by the dials. We have had indexers who I think really understood why the third hand on an ordinary dial had a reverse motion to the others, but beyond that their intelligence did not go. These men are exceedingly liable to make mistakes, and this, I suppose, is not much to be wondered at, as they are continually on the "go," and really have but scant time wherein to tell long stories or enter into long-winded explanations. If the nature of the service would warrant the employment of a more intelligent class of men, I do not know that there would be so great an objection to an indexer being instructed to state the meter reading, or even to making out a bill on the spot, as has been suggested by one gentleman. Ordinarly, I believe the better way is to have the bill made out at the office.

Mr. Foster—That is all very well in large cities; but in small places a different state of affairs prevails. Our town is but a small place. We have a rule for allowing a certain discount when payment is made within a certain time from presentation of bill. We tried the plan of allowing the meter taker to make out the bill; but soon found out that if he stopped to make out the bill, received pay, and made change, it would probably use up two weeks before all the statements were in. Then we made a rule requiring consumers to visit the office, and forbade the indexer to receive any money. We have had a great deal of trouble in consequence of permitting the index taker to give the figures at consumers' houses, which often had to be readjusted afterwards at the office.

Mr. Hyde—The custom at Cleveland, Ohio, on the east side of the river, has been to refuse making known to the consumer the monthly or quarterly value of bills in dollars and cents. If consumers desire it we give them the correct reading of the meter as taken from the dials.

Mr. V. L. Elbert—We adopted this plan at Jackson, Mich., in September, 1884. The index taker has an index book arranged with stubs for the bill and for the figures of his statement; on that statement is placed the previous reading—copied in ink at the office. When the present reading is made the figures are placed underneath those in ink, and the subtraction made; but no figures as to the money value of the bill are given. We never put a money figure on the statements, because they are apt to be carried out incorrectly or left incomplete. With us there is yet another reason. Our bills are subject to a discount if paid at the office within a certain time. On the back of this statement the figures explaining what the discount will be, if account is settled within a certain time, are plainly carried out. Our experience has been very satisfactory under the new scheme, and we have had no trouble whatever. Prior to the adoption of that plan, however, there was constant distrust among the consumers. I would say that we do not permit any inexperienced person to take our statements of meters; we have done so once or twice under pressing necessity, but have suffered from it.

Mr. Foster—Do you collect the bills when you present them?

Mr. Elbert—No; we do not permit any collection at that time. When the bills are brought to the office we can tell if a mistake has been made, as we know about what the consumption should be.

Mr. Foster—You require that the bill be sent to the office for payment?

Mr. Elbert—Yes, sir.

Mr. Foster—In our town we receive considerable money on the first two or three days of the month. In small towns the consumers cannot understand the idea of the gas company requiring that bills be paid at the office; they look upon it as rather arbitrary. They want you to present the bill and collect it.

Mr. Jenkins—At one time I read all the meters myself and left the statements at consumers' houses, making them out off-hand from the meter readings. I soon found that a large number of the consumers wanted to settle right there and then; consequently too much time was taken up in making the circuit. The trouble occasioned by the method was so great that I discontinued it. I afterward adopted the method of reading the meter, then made the bills out, and presented them at once; if paid on presentation I discounted them; in cases where I was told to "call again" no discount was granted. Under the first plan so many wished to settle immediately that I would not care to incur the danger of trusting the average indexer with the business of collection.

Mr. Somerville—Mr. Lindsley insisted, and I thought very properly, upon the point that the officers of a gas company should be filled with "the milk of human kindness" at all times. It would be very agreeable indeed if they were. And yet he says that the person who takes the index must not tell the consumer the amount of his bill. If they ask that very natural question he is instructed to tell them to go to the office, which may be three miles away. "Come down to the office, and they will tell you what the bill is." Now I do not think that is altogether agreeable—I certainly would not think it so. This matter of inspectors is a most important one, since it very often happens that these men are the only gas officials whom the people know. They are the men most often brought in contact with your consumers; and if they are not gentlemanly in their address—all I have got to say is that they should be, and the gas company should have only just such men. You have no right to send an uncouth man into the house of a consumer. I will state what the London practice is—and it is just possible that that system prevails all over Great Britain. By the side of the meter a card, ruled out with the day of the month, the reading of the index, and the amount of gas consumed, is hung up. The indexer has to remove that card, carefully place thereon the present statement, and subtract it from the total of past readings, place the money value of gas consumed on the card, and replace it where the consumer may come and look at it. I think it a very good plan; and I do not believe that it is altogether right to bluff a consumer off with "Go to the office."

Mr. W. H. Odiorne—I will mention the plan adopted by us at Springfield, Ills., and may preface it with the assertion that the method works well. In the first place all our bills contain a printed statement of the meter as read on the first of the month. When the indexer visits a house to read the meter, should he, on emerging therefrom, be asked by one of the occupants as to the quantity of gas that had been burned, instead of replying, "I don't know; go to the office, and they will enlighten you," he says, "I cannot tell you how much you have burned; but I can give you the statement I have just taken. If you compare that with the statement taken on the first of last month, and now in your possession, you may determine for yourself." This satisfies them, and many of our consumers now make regular monthly comparisons on their own account.

Mr. Michael Moran—I think that one of the best things that can be done by any and all of our gas companies is to teach the consumer how to read the meter. It would pay us to have the services of an expert for this very purpose. I have tried it in our city of Joliet, Ills., and I may safely say that nine in ten of my consumers can read their meters with as much ease as they can tell the hour by looking at a watch or clock.

With termination of discussion on subject introduced by Mr. Lindsley, President Lansden proclaimed that the next paper on the list was that presented by Mr. Byron E. Chollar, of Topeka, Kansas. This contribution was entitled—

GAS BILLS VS. GAS LIGHT.

The author read as follows:

In his lecture on the art of money getting, Mr. Barnum, the so-called

prince of showmen, told his audiences that the great secret of continued success in business was always to give people their money's worth. The idea that he intended to convey is not that close margins of profit are always demanded; but really that one's patrons should be made so well satisfied that they would naturally consider themselves as the real gainers.

To gas manufacturers the above idea is especially applicable; for if there be but one industry in the world whose supporters are inclined to think that they do not get value received for their money, that one is certainly the business of gas supplying.

What we manufacture and sell is an actual physical substance that can be weighed and measured. What our customers require is not a substance at all, but only a force that we can neither weigh nor measure. Its value can be estimated by comparison with a similar force. We can speak of a cubic foot of gas, or of a pound of gas; while to speak of a foot or a pound of light would be sheer nonsense.

Our consumers, therefore, purchase our gas only for the light afforded—the question of cubic feet does not enter into their computations. The cost of a required amount of lighting is what they look at; yet they give little or no attention to economical methods of using the article. As long as gas furnishes them with what seems to them to be the most suitable and satisfactory light for their requirements, just for that length of time will they remain patrons of gas companies; but when some other source of light, that strikes them more favorably, is brought to their notice, they will immediately adopt it and "drop the gas."

If, therefore, we can enhance the value of the services which our goods render to our customers, without a corresponding increase in cost to them, they will by just that increase be more likely to remain with us. It matters not to them how such result is effected—whether it be by improvement in actual quality, or by placing them in the way of using the same quality to better advantage.

The latter plan would appear as affording the better field for eventual profit to gas companies, and this for the reason that much can be done in that direction at comparatively small cost. There is probably little or no exaggeration in saying that the average gas burner develops not to exceed two-thirds of the light that it ought to afford.

This is easy to understand when we consider the fact that, with common coal gas, about 94 per cent. of its volume gives no light at all—the lighting service being derived from the remaining six per cent. Now, as we cannot destroy what is not there, the action of bad burners, or of good ones, burning at a wrong rate, must necessarily operate entirely upon this six per cent. of illuminants. It follows, therefore, that a destruction of two of these parts, amounting to but two per cent. of the whole volume, will effect a loss of 33 per cent. in light. If three of the parts are destroyed, the loss of light will be one-half.

The following are notes of experiments with various burners, nearly all of them taken directly from consumers' fixtures. In none of the cases had complaint been made that these burners were especially bad. The opinion was general, however, that the gas was bad, and its price too high; and also, of course, that the meters registered more gas than was actually consumed. The illuminating value of the gas ranged between 16½ and 17½ candles; in making the computations it was assumed to be 17.

A "No. 6" burner, at 5 feet per hour, gave 248 per cent. more light than a smaller one using 3.7 feet per hour; 35 per cent. more gas gave 248 per cent. more light. One dollar's worth of light cost the consumer $2.60—or developed 6½-candle light from 17-candle gas.

A "No. 6," at 5 feet per hour, gave 172 per cent. more light than did a "No. 3," at 4½ feet per hour—a gain of 143 per cent. on the bad burner. This one made a dollar's worth of light cost $2.43; or reduced 17-candle gas to 7-candle.

A "No. 5," at 5 feet per hour, gave 105 per cent. more light than did a "No. 3," at 3 feet per hour—or caused a dollar's worth of light to cost $1.23; or reduced the candle power from 17 to 14.

A "No. 5," at 5 feet per hour, gave 875 per cent. more light than did a "No. 1," at 1.2 feet per hour—making a dollar's worth of light cost $2.30; or reduced a 17-candle gas to 7½ candles.

A burner, consuming 9.7 cubic feet, was replaced by one affording the same light with a consumption of but 7.2 cubic feet—or a saving of nearly 26 per cent. to the consumer.

A burner, consuming 7.2 cubic feet, was replaced by one rated at 7 cubic feet, and 70 per cent. more light obtained therefrom; or a net gain of 66 per cent. in light being secured to the consumer.

An old "No. 3" tip, in an opal globe, was compared with a "No. 6," at 5 cubic feet per hour, with the following result: The "No. 6" consumed 10 per cent. less gas, and gave 640 per cent. more light. When the "No. 6" was turned down so as to give a light equal to the one in the globe, it consumed but two cubic feet per hour.

A "No. 6," at 5 feet per hour, gave 160 per cent. more light than did a "No. 4," at 9½ feet in an opal globe. The consumer had the pleasure (?) of paying one dollar for about 20 cents' worth of light.

The following few experiments will give an idea of the amount of gain arising from the use of moderately large burners. They are not now given as showing something not known before, but are merely offered as notes of actual everyday practice.

A "No. 10" tip, at 11.2 feet, gave 160 per cent. more light than that afforded by a Sugg's "No. 1, London Argand," rated at 5 feet per hour—a gain of 13 per cent. over the Argand; and increased the candle power of the gas from 17 to 19.25.

A "No. 6," at 5.8 cubic feet, gave 18 per cent. more light than did a sample of Sugg's "No. 1," at 5 feet—a gain of about 2 per cent. for the flat flame.

Another "No. 10" tip, at 11.4 cubic feet per hour, gave 200 per cent. more light than did a specimen of Sugg's "No. 1," at 5 feet—a gain of 32 per cent. for the flat flame. The same burner, at 11.6, gave 220 per cent. more light than that developed by the Argand—a gain of 38 per cent. for the flat flame.

In the face of such facts is it at all surprising that gas consumers doubt the reliability of gas meters, or dispute the fairness of gas bills? If gas companies expect to hold their own against the sharp competition of other lights, which competition is sure to come in the near future, they will have to see to it that their customers get somewhere near the maximum of value for their money; or, to use a slangy, but forcible, expression, "to work their gas for all it is worth."

Discussion.

Mr. E. McMillin—What pressure did you carry when making the experiments?

Mr. Chollar—I paid no attention to pressure conditions. I simply noted the quantities of gas consumed by the burners. The important thing to determine is the quantity of gas that the burner consumes under ordinary conditions.

Mr. M. Moran—Did your experiments cost your company anything.

Mr. Chollar—No, sir.

Mr. T. Smith—Did you test by jet photometer?

Mr. Chollar—No, sir; I employed a bar photometer.

Mr. M. McMillin—How did you adjust the pressure?

Mr. Chollar—I adjusted the pressure according to the rate of burner. I think you will find it much better to rate the burner, because then the pressure is rated at the same time.

Mr. M. McMillin—To deliver a certain quantity of gas under a certain pressure the burner aperture must be of a given size. Suppose you increase the aperture—then to maintain the same rate of consumption as before the pressure must be increased. That the best results from any burner may be obtained requires the maintenance of a certain pressure.

Mr. Chollar—It requires a certain rate, which is the same thing. If you change the rate you change the pressure.

Mr. McMillin—Say you have an aperture of a certain size, or one at which the gas is burning under inch and a-half pressure—do you mean to claim that you would have the same rate when that quantity of gas was burned under 2½ inches of pressure?

Mr. Chollar—Not at all. The question is, how much gas have you got to burn in order that the maximum light be developed. The pressure is included in the rate of burning. It, of course, requires a certain pressure; but I do not care what the pressure is. What I want to know is how much gas that burner will consume. It is not necessary to take the pressure.

Mr. Jenkins—A burner working under one inch pressure consumes five feet of gas per hour; now, if you double that pressure it will consume 7½ feet per hour. What is the difference in lighting value, or cost of same to consumer?

Mr. Chollar—It would seem as though that question answered itself. The great trouble with burners is their irregularity. If you buy two packages of "No. 6" burners, and test them by the photometer, you will find that although rated the same, they do not consume equal quantities of gas. One will burn 5 feet, while another may take up 6 feet.

Mr. M. McMillin—The fishtail burner can be used to advantage under high pressures, because you may turn it down to a point where there will be neither whistling nor blowing, and yet have a pretty good illumination.

Mr. Chollar—I found that the fishtail burner worked best under an especially low pressure.

Mr. M. McMillin—That may be; but you can employ it under high pressures in the way spoken of. These burners are rated 1, 2, 3, 4, and up, and they will burn about the rated quantity of gas. We know that if ten feet of gas are passed through a two-foot burner it will give the same light under similar pressure. What I want to get at is how you can say that the pressure is immaterial.

Mr. Chollar—If you take a "No. 1" burner and allow it to burn one foot

an hour a certain pressure is required. If you force it to consume ten feet per hour, then another certain pressure is necessary. Now, what is the difference whether you know it is five-tenths or seven-tenths, or that the consumption is one foot or five feet? It is the same thing; one implies the other. The rate depends upon the pressure; and if you have the rate the idea of pressure is also conveyed. As a rule, a medium size excavated head requires less pressure than other sorts—the rate of consumption is better.

Mr. M. McMillin—According to tests made by me some years ago I found that the ordinary excavated head was not reliable.

Mr. Chollar—I do not find anything better, provided they are burned at the proper rate.

Mr. M. McMillin—My experience is that, for 16-candle gas, eighteen-tenths pressure gives the best results. In the case of the experiments which I have just mentioned the pressure in any case did not exceed two and three-tenths. I deemed it very essential to determine what the pressure was.

Mr. Chollar—What quantity of gas did that excavated head consume in an hour?

Mr. M. McMillin—I do not remember now.

Mr. Chollar—You did not estimate the rate, and I did not estimate the pressure.

Mr. M. McMillin—A burner consuming 2½ feet per hour would not give the same light that it would when consuming double that quantity.

Mr. Chollar—I suppose not. It is like buying a bushel of wheat—what is the difference between measuring it and weighing it? You get the same final result.

Mr. McMillin—Suppose your burners are accommodated to the rate of consumption desired—then does it not make any difference whether the pressure in the street be at one-tenth or five-tenths?

Mr. Chollar—Yes, it does; you change the rate and you change the pressure.

Mr. Jenkins—How do you determine the pressure at which your burners should be adjusted?

Mr. Chollar—I use a pocket meter, which is in the main quite reliable, although sometimes the graduation is not to be depended upon.

Mr. E. J. King—At Jacksonville, Ills., in dealing with our consumers in the matter of burners, we take one of the old specimens, screw it on a bracket, and ignite the gas. After the consumer has noted the light we then put on the bracket a sample of an improved burner. He makes his comparisons, and the effect is evident, even though no figures regarding hourly consumption are there shown. This test or plan has been of great value to us.

Mr. Howard—I do not know of any reason why the managers of small works should allow their consumers to use poor burners. At Dubuque we purchase the best burners that the market affords—those that will give the best lighting effect in connection with the least possible expenditure of gas. We present these burners to our customers, and it pays to do it. We even go further than that, as in the evening we frequently send a man to visit the storekeepers' premises, instructing him to observe those burners which are not working properly. Next day he replaces the defective burners with sound ones. I believe that if every small company in the country would spend about $50 in furnishing their consumers with the best burners obtainable they would have much less bother while collecting their gas accounts.

Mr. L. K. Scofield—Mr. Howard, what style of burner do you use?

Mr. Howard—I buy the check burner, with straight tip. We instruct the consumer that he can regulate the burner so as to obtain whatever quantity of light he requires, by simply turning down the check. One consumer instructs another in regard to it. We charge nothing for the burners, nor for the labor of attaching them. The practice pays us right well.

On motion of Mr. Howard, a vote of thanks was tendered to Mr. Chollar.

Mr. Geo. Shepard Page, of New York city, then read the following paper on—

THE COOPER COAL LIMING PROCESS.

A constant subject for discussion among gas engineers during many years has been the possibility or probability of the discovery of some process by which the purification of gas could be economically effected in closed vessels. Many experiments have been tried, some of them on a large scale, based on the introduction of chemical compounds into the washing and scrubbing apparatus. Within the past seven years it has been demonstrated that ammonia could be removed entirely in closed vessels; but the sulphur compounds and carbonic acid have been more difficult to deal with.

During the past two years the technical journals have contained communications, letters, discussions, and editorial comment referring to the process (identified with the name of Mr. W. J. Cooper, of England) known as "Cooper's coal liming process." The name indicates, to some extent, the plan pursued, which is to incorporate with the coal, before charging the retorts, a certain percentage of lime. The process of mixture is as follows:

To the coal, either in a lumpy condition—such as that of coal used in gas manufacture—or, by preference, in a state of fine division, is added hydrate of lime, and the mixture is well incorporated. The quantity of lime used is between 50 and 60 pounds to every ton of coal, the lime being slaked with about its own weight of water—5 gallons—whereby it is brought into such condition as to admit of ready commingling or mixture with the coal.

The products which arise in the distillation of limed coal differ materially from those obtained in the ordinary course of gas manufacture, or by the distillation of coal pure and simple. Limed coal yields a larger fraction of its nitrogen in the form of ammonia, a slightly larger fraction of its carbon being in the form of volatile compounds—that is, there is an increase in the tar and gas taken conjointly—a smaller fraction of its sulphur is in volatile form; and it yields limed coke instead of common coke. There are, however, hardly any physical differences between limed coke and common gas coke; an occasional white speck, where the lime has failed to mix perfectly with the coal, being the only apparent distinguishing feature. The differences show themselves when the coke is burned. Common coke, as most persons know from experience, gives off an abundance of the fumes of sulphurous acid during its combustion. Limed coke, on the other hand, evolves very little sulphurous acid during combustion; and if the original mixture of lime and coal were absolutely perfect there would positively be no sulphurous acid. The limed coke has another advantage, inasmuch as lime and calcium compounds generally are pre-eminently non-volatile. The addition of lime to the coal before the distillation must be equivalent to the addition of so much mineral matter to the ash of the coke given by the coal.

Limed coke manufactured from a given quality of coal must necessarily contain more fixed matter or ash than common coke from the same quality of coal. Fuel which leaves much ash is considered objectionable; it was anticipated, therefore, that limed coke would not burn as well as common coke. This anticipation has been negatived by the very large quantity of limed coke produced and burned under a great variety of circumstances; and it has been observed that the limed coke burns brighter, quicker, and readier than common coke. The explanation of this is that the thin film of calcium compound which coats the coke acts as an oxygen carrier as it is gradually burned away in the fire. Limed coke is thus well adapted for domestic use.

The additional advantage claimed for the carbonization of limed coal is that it yields a larger percentage of nitrogen in the form of ammonia. It will be of interest to state in this connection that the production of ammonia from the London gas works—in which city about 2,000,000 tons of coal are carbonized annually, and from which 5 to 6 pounds of ammonia (NH_3) are produced from each ton of coal—reaches an annual total of over 10,000,000 pounds; but if all of the nitrogen in the coal were obtained in the form of ammonia, the yield would be from 25 to 50 pounds of ammonia per ton of coal carbonized, the value of which, even at the present low price of sulphate of ammonia, would be $7,000,000, or $3.50 per ton of coal carbonized.

It is claimed that Cooper's process increases the yield of ammonia very considerably without sacrificing the coke. It is asserted that from 12 to 15 pounds of ammonia per ton of coal can be obtained from coal when thus limed. As has been stated, the apparatus for the removal of ammonia has been so thoroughly perfected within the past few years that this product can be entirely removed before the gas reaches the purifiers.

The next most important impurities with which the gas manager must deal are the sulphur compounds. It is well known to chemists that the sulphur present in organic compounds can be made to attach itself to calcium by simply heating the organic compounds in contact with lime. It will therefore be understood that limed coal should yield little or no volatile sulphur compound when it is employed in gas making.

Sulphur occurs in crude gas partly and mainly in the form of sulphuretted hydrogen, and partly in the form of sulphur compounds other than the sulphuretted hydrogen—which consists mainly of bisulphide of carbon; but it is well known that there are other sulphur compounds as yet but little understood. Both the sulphuretted hydrogen and the other sulphur compounds are diminished by the Cooper process of manufacture.

The percentage of sulphuretted hydrogen in crude coal gas varies from 0.6 to 1.5 volumes. The sulphur other than the sulphuretted hydrogen in crude coal gas competent authorities have claimed to be less than 0.3 volume per 100 volumes of gas.

The following experiments at the Vauxhall station of the South Metropolitan Gas Company, where in one retort house limed coal was used and in another unlimed coal, the comparative testings of the gas gave the following results: First experiment—limed coal, 14.4 grains of sulphur in 100 cubic feet of the gas; unlimed coal, 26.3 grains of sulphur in 100 cubic feet. On another occasion the limed coal gas product showed the presence of 10.4 grains, while the unlimed specimen contained 27 grains of sulphur per 100 cubic feet.

At the Tunbridge Wells (Eng.) gas works, using a coal which contained 1.7 per cent. sulphur, an average of 3 grains of sulphur per 100 cubic feet of

gas was maintained for three weeks. The lime purifier has been discontinued at these works and oxide of iron used exclusively, with the result before stated—that is, but 3 grains of sulphur to the hundred feet of gas.

An important feature of this process, and one that very rarely can be claimed for experiments in any branch of manufacture, is that no new plant is required; but, on the contrary, the plant is diminished. Neither is any new material brought into the works, for lime has been used ever since gas manufacture began.

The cost of the lime used, including slaking and application of same to the coal, is about 12 cents per ton. A small allowance for extra retort room is to be made, for a ton of coal without lime gives, practically, about the same amount of gas as is obtained from a ton of the limed coal. This allowance is, say, 5 cents. The debit side of the account is therefore 17 cents. On the other side there are several items. The cost of the lime is to a great extent covered when the coke is sold, and consumers have acknowledged the advantage of lime in the coke by paying for it; but the chief item is the saving in the cost of gas purification. It is claimed that this amounts to 90 per cent. in the labor, and almost an entire saving of the purifying material. Economy in the purification may be reckond at 14 cents per ton of coal carbonized, a gain in ammonia of 20 cents per ton of coal, and in tar a gain of 5 cents. There is a net gain, therefore, of over 25 cents per ton of coal carbonized; and this gain has been greatly exceeded at Tunbridge Wells.

In addition to the preceding advantages there is added the saving in purifying plant. Many gas works find great difficulty in keeping pace with the demands for purifying plant to meet the requirements of the winter make of gas. In such cases the adoption of the liming process would save a large expenditure. Again, the abatement of the nuisance caused by exposing the boxes to the open air would be entirely avoided. The possibility of doing away with the lime purifiers will permit many gas works now located in the vicinity of residences to continue without complaint.

The question will be asked, "What becomes of the carbonic acid?" To which the answer is given that the use of the lime in retorts does not diminish the proportion of carbonic acid which comes out of the gas, but the extra ammonia which was formed absorbed some of it, and thus reduced the carbonic acid to a minimum.

The following theoretical explanation of the chemical action has been given: Gas as it left the retorts contained 0.4 per cent. sulphuretted hydrogen, and 1 per cent of air entering the gas would give sufficient oxygen to consume it. What was really done by the process when properly managed was to make use of this trace of air—to practically do all the purification by its aid. The oxide of iron purifier became the sulphuret of iron sponge, the function of which was to transfer oxygen from the trace of air to the sulphuretted hydrogen. This explains the process as one operating in closed vessels.

To refer again to the advantages in the purification department which will result from the use of limed coal, it is asserted on competent authority that about half the work of purification was done in the retorts, so that nearly half the sulphur goes forward to the purifiers. In consequence of this the oxidation or revivification of the oxide of iron may be effected without the cost of removal for a very long period, and then it may be further prolonged by the admission of a small percentage of common air into the first purifier of the series, the exact proportion being defined and passed in through a meter. The only drawback is the reduction of the illuminating power to the extent of about two-tenths of a candle.

In May, 1884, the manager of the Tunbridge Wells gas works stated that the process of oxidation in the purifiers was commenced on the preceding 31st of January, and was still going on—number one of the purifiers being still number one of the series of three, and showed no sign of diminished activity, though the gas product of 6,400 tons of coal had been passed through in six months; and that there was no apparent reason why the action might not continue efficiently through the entire year, in which event the coal liming process would have to be credited with the purifying of the gas from more than 12,000 tons of coal, through a period of 14 months, without opening a single purifier. The importance of this statement will be realized by every gas manager who has been worried by the great nuisance and expense of frequently, and in some instances daily, opening purifiers and emptying and refilling them with revivified material, or supplying them with fresh lime. Under this same date Mr. Spice claims an increase in ammoniacal liquor from 28½ gallons of 10-ounce, obtained regularly from unlimed coal, to 37 gallons of the same strength per ton of limed coal—an increase of over 30 per cent. The net income from those works in one year, properly credited to the coal liming process, in the added ammonia, amounted to $1,800.

With regard to the product of gas per ton of coal carbonized, a slight increase is shown. The candle power of the gas remains about the same. In the consumption of limed coke less air is required for its combustion, and with attention to this point in the regulation of the flue dampers there will be no fear of the fluxing or destruction of furnace settings or of grate bars. While burning it gives greater light and brilliancy than the ordinary coke fire.

It may be of interest at this point to refer to the statement made by Prof. W. Foster, a distinguished London chemist, that of the total nitrogen in coal it was found that, in gas manufacture, 14.5 per cent. was available as ammonia, and 1.56 per cent. as cyanogen; 35.26 per cent. was left in its elementary condition in the gas, and 48.68 per cent. was left in the coke. A pertinent question, then, is that of Prof. Foster: "How can gas engineers increase the yield of ammonia in their gas manufacture?—a question in which we are all deeply interested, in view of the fact that any increase in product of obtainable ammonia adds materially to the income of every gas company." It is possible that in this new process of carbonization the key to this hitherto lost ammonia has been found.

Some notable authorities may properly be quoted here who have experimented practically with the Cooper coal liming process, and who report the following gains in ammonia obtained: Mr. G. E. Stevenson, 22.5 per cent.; Mr. Eastwood, 18.8 per cent.; Mr. R. O. Paterson, 20 per cent.; Mr. Wright, 20 per cent.; Mr. Wilton, 35 per cent.; Mr. Leicester Greville, 28 per cent.; Mr. Botley, 100 per cent.; and Mr. Dougal, 30 per cent.

The following is a concise statement of the effect of lime upon the sulphur in the coal: Coal used in gas works contains about one per cent. sulphur; when gas is made, part of this sulphur goes into the gas in the form of sulphuretted hydrogen, and part remains behind in the coke. It costs from 16 to 20 cents in labor and material per ton of coal carbonized, and about the same amount in interest on the plant, to remove this sulphuretted hydrogen, and entails upon the gas works the creation of one of the worst nuisances in the whole range of manufacturing industry.

It is claimed that Cooper's coal liming process supplies a remedy for manufacturing gas up to the London standard of purity—that is, with less than 20 grains of sulphur in 100 cubic feet of gas—saving 90 per cent. of the cost, and abstaining from the creation of the nuisance.

If we can have an unsulphurous coal, or if we could extract the sulphur before carbonizing the coal, the difficulty would be done away with; but there is no probability of either of these tasks being accomplished, and Cooper's process aims to work in the way of neutralizing the sulphur in the coal by means of a slight excess of the lime.

At the Tunbridge Wells gas works, where the process has been in operation for 18 months, the lime and coal, in the proportions stated, are fed into an incorporating mill, in which they are blended by being passed between two toothed rollers. The limed coal falls into a receiver, from whence it is lifted by elevators to fixed hoppers in the retort house, where it is stored for use.

It is a well-known chemical fact that at the temperatures and under the conditions realized in the interior of the gas retort sulphur has a greater tendency to unite with calcium than to unite with hydrogen, with carbon or with oxygen; and if there were an absolutely perfect mixture of lime with coal there would be absolutely no escape of any sulphur into the gas.

In practice the mixture is only approximate, and accordingly in practice the purity of the gas is only approximate; but the approximation is good enough to insure the most important results. This process is rapidly gaining ground in England, and has been adopted by many gas companies.

In conclusion, the following letter from one of the most distinguished of England's gas engineers, Mr. R. P. Spice, of London, will give particulars of twelve months' working of the Cooper coal liming process, at Tunbridge Wells, for the year ending the 31st of December, 1884:

"21 Parliament St., Westminster, March 25, 1885.

"Dear Sir:—In reply to your inquiry concerning the working of this process at the Tunbridge Wells works, I am happy to say that my early estimates of its value have been abundantly confirmed by prolonged experience.

"It has now been in operation 17 months without intermission, and has stood the test of two winters without giving the slightest cause for uneasiness as to the certainty of the chemical action in minimizing the quantity of sulphur compounds.

"The particulars you desire may be stated thus: When at these works purification was effected by the usual method of sulphide of calcium and oxide of iron, a purifier would only last ten days in the winter months before it became inoperative, and had to be thrown out of action, its contents discharged, the oxide revivified and returned to the vessel; or, in the case of a lime purifier, the foul lime, in a noxious state, giving off into the surrounding atmosphere the most abominable odors, was deposited on the open ground within the works, because in that district there were no means of getting rid of it; the purifier from which it had been removed was then recharged with fresh lime. And this system of purification, which has been the only known method of effecting that degree of purity now commonly imposed and required by acts of Parliament, a printed list of which I send you herewith, can only be regarded as a great nuisance when the work is done within a mile or so of residential districts.

"At Tunbridge Wells, however, all this nuisance and its attendant expense, which adds, under general circumstances, about two pence per 1,000 feet to the cost of gas, has been entirely abolished; only one oxide of iron purifier having been opened in the last 17 months. This was done at the end of 11 months, because it was then discovered that sufficient space had not been left in the vessels, upwards, to allow for the expansion of the material, due to the accretion of the sulphur which was arrested.

"When opened, and the lesson thereby taught was duly weighed, it was acted upon by removing the whole of the 30 tons of oxide, which was found to contain 40 per cent. of sulphur, and returning only one-half of it to the purifier, the other half of it being put into store for future use; this being done, the same purifier and its 15 tons of oxide has been doing all the work as efficiently as before.

"At the time this purifier was opened it had purified 101,627,000 cubic feet of gas; and in the last six months it has purified about 60,000,000 feet in addition, making in all, say, 160,000,000 feet of gas purified as fully and efficiently as is done by the sulphide of calcium process. This one vessel, which has been opened only once in 17 months, is still doing all the work which formerly required five to be used, and will probably not require to be opened again for several months to come.

"The efficiency of its action may be judged of by the fact that the sulphur compounds, in the three most trying months of the year—namely, November, December and January last, were, the mean between the highest and the lowest, 10.17 grains per 100 feet of gas, the extreme variations being only 2.05 grains higher or lower.

"There is, therefore, no pretence for the continuance of the contention that these objectionable impurities cannot be kept down without the use of the foul lime purifier, which involves a nuisance; and I contend that the coal liming process is by far the more reliable and preferable method of the two. It is indeed notorious that the greatest care, skill and constant attention is indispensable to the complex system of lime and oxide purification; and with all the care and skill of competent and experienced men it does sometimes happen, as it did, not long since, at the gas works, Newcastle-upon-Tyne, where the sulphur compounds were suddenly found to be 28.98 grains in the 100 feet—in round numbers 9 grains more than is allowed by the company's special act of Parliament; and for this accidental delinquency the company was fined ten pounds and costs, the full penalty of 20 pounds being mitigated; and although this is a well managed concern, nobody in the employ of the company could "tell the reason why," or how the impurity had been caused.

"Now let me assure you seriously that there is one thing which I do not understand, and have not been able to comprehend, in connection with this matter. If the new process had involved more trouble or care on the part of gas managers, I could understand its being frowned upon; or if it had cost more than the old system, which, after all, is not really old and venerable, I could imagine economical considerations to have stood in the way of its adoption; but as simplicity and economy and sanitary advantages are all in its favor, it is to me amazing that it should be so much maligned.

"It has been proved to be a great success at Tunbridge Wells, and this success I venture to think will be made plain by the following statement of facts concerning the actual working results of the year ending 31st December, 1884:

"*Summary of Twelve Months' Working of the Cooper Coal Liming Process at Tunbridge Wells.*

"11,473 tons of coal carbonized in 1884 would have cost, for purification, on the London method.....		£573 13 0
"The actual cost of purification up to the London standard of purity was.....		3 0 0
"The saving in purification being.....		£570 13 0
"Additional cost of carbonizing, for lime used in the retorts.....	£243 18 4	
"Less the value of the lime added to the weight of the coke.....	139 4 0	104 14 4
"Net saving in purification.....		£465 18 8
"Increased value of sulphate, estimated on the average market price of the last ten years, ending the 31st December, 1884.....		£282 3 9
"Net money advantage.....		748 2 5

"Equivalent to 1s. 3¼d. per ton of coal carbonized.

"I have said nothing about other economical advantages which are obvious; but in conclusion I will refer to one fact which cannot be denied, and that is the saving which may be effected in the cost of the expensive purifying plant required to enable gas managers to keep the sulphur compounds down on the old system of working. Mr. Geo. Livesey put this at a penny per thousand feet on the gas sold, and I quite agree with him.

"At Tunbridge Wells three-fourths of the plant is not now required; five sixths of all the impurities which are contained in crude gas when carbonized on the old plan, are now so acted upon that they do not get beyond the retort, hence the purifiers have only one-sixth of the work to do which they formerly did. I am, dear sir, yours faithfully,

"R. P. SPICE."

[To be continued.]

[A Paper read before the Guild of Gas Managers.]

Condensation; or, the Elimination of Tar from Coal Gas.

By A. B. SLATER.

A fact well known to all gas engineers is that in the distillation of coal for the manufacture of illuminating gas under the ordinary methods, during the first portion of the time, whether it be three, four or five hours, in which the coal remains in the retorts, large quantities of heavy hydrocarbon vapors are carried over, the quantities depending upon the temperature maintained in the retort, as also the weights of coal used in the charges. These vapors are, to a considerable extent, condensed or deposited in the hydraulic main; but in any case a large portion of them are carried along, and their elimination secured by apparatus specially designed for the purpose.

It is highly important that the greatest possible quantity of the tarry matter be removed from the gas before it reaches the purifiers, since, if the tar be allowed to effect lodgment in the boxes, the purifying material becomes clogged, the result being an undue back pressure, and loss of duty, which, under proper conditions, should be secured from the purifying material employed.

Until within a few years the ordinary method adopted for the elimination of tar from crude gas was obtained under various forms of apparatus; but all these were designed to accomplish the desired result through the application of the principle of condensation of vapors by reduction of the temperature; hence the apparatus was of any convenient form (according to the judgment of the engineer) which would present surfaces of large area to be cooled by water or air.

While the application of this principle in the condensation of simple watery vapors was perhaps efficient enough, still it was never successful in eliminating the heavy hydrocarbon vapors from crude coal gas; and probably one of the most lamentable instances of such failure was that which resulted in the death of Mayor Blake,* of Worcester, Mass., in December, 1870. That disaster was thus occasioned: A considerable quantity of these condensed vapors had accumulated in the bottoms of the purifiers; instead of taking the necessary means of securing their effective removal, pipes, with valves or stopcocks fitted to their lower ends, were introduced into the bottoms of the purifiers, the idea being that these were to be opened when the boxes were changed, in order that whatever product of condensation which might have accumulated there could be drawn off. At one such time, or when a purifier, after having been changed, was again put in action, the workman forgot to close the valve in the "draw-off pipe," and the entire volume of gas, instead of going on in the proper direction, passed rapidly through the "draw-off pipe" into the purifying house cellar. When the door was opened the gas which had accumulated in the cellar rushed out and communicated with the light of a lantern in the hands of a workman who happened at the time to be near the door—it was just at dark—and the explosion at once followed that was accompanied with such disastrous consequences.

Gas engineers, not being entirely satisfied with the results accomplished by any of the apparatus designed upon the principle of condensation by reduction of temperature, have gradually made improvements in the apparatus, as also in the adaptation and application of other and more scientific principles. As a result we now have air condensers, multitubular or water condensers, hot scrubbers, dry scrubbers, friction scrubbers, etc., etc., most of which are, in one respect or another, improvements over the old condensation method or procedure.

Probably the most successful results in the removal of tar from crude gas have been accomplished by the apparatus invented by Messrs. Pelouze and Audouin, of Paris, France, and patented by these gentlemen in that country in 1872. The action of this apparatus, in the removal of tar, "is based on Halley's vesicular theory of vapors, and upon the principle that the liquefaction of the globules thus held in suspension is brought about by contact of the particles either with solid substances or with each other." The first trial of this apparatus or machine was made at one of the stations of the Paris Gas Company, where, "after many months' trial, and some discussion of its theory and merits before the French Academy of Science, and by the gas journals of France, an illustrated article translated from the *Comptes Rendus*, was published in the London *Journal of Gas Lighting*, for October 7th, 1873, and most favorably commented upon by the editor." In May,

* For an account of the disaster that occasioned the death of Mr. James B. Blake, who, besides being the chief executive officer of the city of Worcester, Mass., was Supt. of the Worcester Gas Light Company, see JOURNAL, Vol. XIV., No. I., pp. 3, and 4.

1874, a patent (No. 151,263) was taken out in the United States, and afterwards, in July, another patent (No. 153,886), for certain novelties in construction, was granted to Mr. James R. Smedberg.

The first trial of the machine in this country was made by the San Francisco Gas Light Company, in 1874, since which time numerous other machines have been introduced into some of the largest works of this country. Aside from its effectiveness in removing the tar from the crude gas, another great recommendation for this condenser is its compactness, and the small space it occupies in relation to the work it performs—especially in comparison with the old, cumbrous and expensive machinery formerly in use, and of which it may be said never successfully accomplished the end sought after. On the 6th of October, 1884, the Providence Gas Company introduced a Pelouze and Audouin condenser at their South Station, which has been in successful operation since that time. Aside from reducing the temperature of the gas to the normal standard, the use of the Pelouze and Audouin condenser simplifies the treatment of the gas, practically, to two operations—the removal of the tar, and facilitation of purification; the latter being easily accomplished when once the tar is eliminated. I think we all agree that the application of a large quantity of cold water at any stage of the process of manufacture is highly detrimental, and probably never would have been practiced had the removal of the tar been successfully accomplished.

It is now well known that the proper application of a small quantity of water, at the proper temperature, will eliminate the ammonia, and lime can be depended upon for the removal of the carbonic acid and the sulphur compounds.

SPECIAL ENGLISH CORRESPONDENCE.

Communicated By Norton H. Humphrys.

London, July 10, 1885.

The Recent Meeting of the Gas Institute.—The President's Address.—The North British Association of Gas Managers.—Murdoch Memorial.—Prize Competition.—Sanitary Gas Making.—A Correction.—Public Lighting with Oil.

Having given a general outline of the programme arranged for the proceedings of the recent annual meeting of the Gas Institute, it only remains for me to add that the whole passed off satisfactorily, and to congratulate the Council of the Institute, the local Reception Committee, and their Honorary Secretaries, Messrs. Thomas and Hutchinson, on the success that covered their efforts. The weather was favorable throughout, which was an important item, seeing that the afternoon of each day was devoted to outdoor excursions to various works, etc. It is, perhaps, to be regretted that of the twelve papers submitted to the meeting no less than four were taken as read, for lack of time; but it is difficult to see how this can be avoided. The proceedings, both with regard to the reading of papers and the discussions, start at an easy pace; as time passes they increase in rapidity; and towards the close symptoms of a desire to hurry the papers, and take short cuts through the discussions, manifest themselves in a manner that is hardly complimentary to the readers of the papers, who nave devoted as much time and trouble to the preparation of the same as their more fortunate brethren whose papers happen to come early in the list. It sometimes happens, too, that the papers are not arranged in order of sequence, according to the plan that would appear best in the interests of the members, to whom, of course, the discussions are the principal consideration, seeing that they can read the papers in print at their leisure. This plan would be to put the paper likely to bring out the most useful discussion first, and so on, entirely irrespective of the names of the readers; if this was adhered to the meeting would not lose an hour or more of valuable time discussing a philosophical problem, remote so far as the objects of the Institute are concerned, although very interesting from a scientific view; whilst such important questions of the day as "lighting and ventilating" and "gaseous fuel" are hurried over with no discussion worth the name, and other strictly practical subjects are left out altogether. * * * But it is so easy to find fault, and so difficult to suggest a real improvement!

The premiums for papers read at last year's meeting were awarded as follows: First prize and president's medal, to Mr. W. A. Valon, for his paper on "Generator Furnaces," to which I have frequently had occasion to refer during the past year; the second prize to Mr. F. S. Cripps, for his paper on "Gasholder Crowns;" and the third to Mr. W. J. Booer, of bakers oven notoriety, for a paper describing his gas apparatus capable of being adapted to any baker's oven. The sums dispersed as premiums are scarcely commensurate with the importance of the Institute, this item appearing in last year's balance sheet as £23 ($115), and being divided, as on this occasion, between three recipients. So it barely represents an adequate remuneration for the preparation of the paper, far less anything like a prize or reward, so far as actual pecuniary benefit is concerned.

The inaugural address of the President, Mr. Thomas Newbigging, has attracted much more attention outside the Institute than is usually accorded to these productions; and this, apart from the author's eminence, both as a *litterateur* and a gas engineer, purely on account of its intrinsic merit. For it is a masterpiece of presidential addresses, both in respect to the soundness of its facts and the elegance of its composition; as such it commends itself to the practical man, and also to the classical scholar. It is a pleasing combination of graceful poetical fancy, with stern, rugged truth. Anything like a detailed notice of the various points touched upon is out of the question here, since a special feature of the addrsss is its completeness, scarcely any current topic passing untouched; but the manner in which the electric light was dealt with should be especially mentioned. Probably no one else could have so clearly represented the views of gas engineers on this subject. Many of the daily newspapers are disposed to question Mr. Newbigging's views, as is only to be expected, seeing that most of them aim at tickling the public mental palate rather than administering wholesome food for the mind; and the man who tells the plain, unvarnished truth about the electric light dodges of the last few years, must not expect to please the representatives of public opinion.

But we must pass on from the meeting of the Gas Institute to the forthcoming meeting of the North British Association of Gas Managers, to be held on the 23d and 24th inst., and in connection with which there are one or two special features to be noticed. In the first place a spirited endeavor is being made by this Association to raise a memorial fund for the purpose of perpetuating the memory of William Murdoch, the founder of gas lighting. This, of itself, would constitute a good reason for offering exceptional honor; but according to a brief epitome of Murdoch's life, attached to the subscription list which has been widely circulated amongst the profession, it appears that he has many other claims, and that he is indeed entitled to be styled "a great Scotch inventor." One or two inventions with which he has been generally identified—the mechanical movement known as the "eccentric," for instance, do not appear in this list; and Murdoch is credited with having freely given his inventions in connection with gas lighting to the world, but so far as may be judged from the published accounts of his life, it appears to have been rather through inadvertence than intentional generosity that he failed to protect his system of gas lighting by letters patent. He was so much engaged with steam engines and other matters that he does not appear to have appreciated the important position to be occupied by the gas industry. However, all will agree that a handsome monument to his memory would be but a simple act of justice; and the work he did in connection with steam engines entitles the movement to liberal support from all users of steam power.

In connection with this meeting there is another feature, also of a cosmopolitan character, in the shape of an open competition for the best papers on, "How best to utilize gaseous fuel and coke for domestic and industrial purposes, with a view to abate the smoke nuisance in towns." The first prize (value £50) has been offered by Mr. Allan, proprietor of *Gas and Water*, and the second prize (£20) by Mr. Ellis Lever, of Liverpool; in addition, the adjudicators have the right of recommending a third paper for a special prize. This system of open competition, in connection with essays treating of particular subjects, appears to be gaining favor. It has been applied several times lately in connection with various subjects, though never before, so far as I am aware (perhaps the small premiums offered by the Gas Institute should be mentioned as in some sense exceptions), in connection with the gas industry; and it will be interesting to watch the result of this innovation. It can scarcely be otherwise than satisfactory; but, in any case, the North British Associction deserves credit for the energetic way in which they have taken the matter up. The extra work thrown upon the Honorary Secretary, Mr. David Terrace, by these special features will also receive proper appreciation, and, I may almost venture to add, substantial recognition.

Prof. Wanklyn, ever indefatigable in the interest of Cooper's coal liming process, has appeared before the Association of Municipal and Sanitary Engineers and Surveyors, with a paper on, "Sanitary Gas Making." He is rather severe on the gas industry. To say that certain parts of the process of gas making are "peculiarly disgusting," and consequently that a gas works has to be banished as far as possible from human habitations, is stepping outside the bounds of strict veracity, seeing that numbers of gas works are closely surrounded on all sides with "human habitations," and the only disadvantage (?) due to close proximity to the "peculiarly disgusting" works is that the people enjoy a marked freedom from cholera; and also, though perhaps in a less extent, from other zymotic diseases. Then the Professor ventures the statement that, up to the introduction of Cooper's process, "very little had been done in the way of rendering gas manufacture cleanly." But, while Cooper's process is to prevent the pollution of the atmosphere by foul purifying material, it is with some surprise that I find, after the above statement, that it is not equal to the entire cure of the present dirty habits of gas engineers. It is not the real "Pear's soap" that is to wash the black man white; but, of course, it is indispensable to that process, for under the

ennobling influence of Cooper, the Professor infers that the gas engineers' present slovenly habits and feeble intellectual powers will be stimulated and strengthened to the perception of nuisances and defects to which he is at present blind. One of these is the emission by the chimneys of yellow smoke at short intervals, due to the combustion of small quantities of tar in the retort house. When the retort is opened, we are told, the small quantity of tar in the mouthpiece is partly burned, and partly mixed with the coke, rendering it dirty. The action of mixing tar with red-hot coke, by-the-way, must be a peculiar one. The remedy for this serious nuisance (?) is a descending ascension pipe and an underground hydraulic main. The next thing is that gas liquor is allowed to leak into the ground and evaporate into the air; and this is due to "bad habits which date from the time when gas liquor had no commercial value." After this what board of directors can have the temerity to avoid insisting on the adoption of Cooper's process, with the attendant benefits of no yellow smoke or waste of liquor?

Coming down to sober fact, it appears that the Cooper process proper is entitled to some credit, not for avoiding altogether the nuisance attendant upon the exposure of foul purifying material, but for enabling the purifiers to go longer and require less frequent changing. It is true that at Tunbridge Wells the purifiers have gone a year or so without opening; but this was effected by the admission of air into the gas—a process which is in no way related to Cooper's process, and which, with the precaution of ample washing and large purifiers, might be adopted at any gas works. And without these precautions, the necessity for which, in ordinary working, has been generally known for many years, it is impossible to avoid nuisance under any circumstances. There is no reason to doubt the claim that the Cooper process retains a considerable proportion of sulphur in the retort, leaving a proportionally less amount of work for the oxide purifiers to do; but this fact has no bearing upon the nuisance question, except in degree—perhaps where a purifier was formerly opened every month, now it is only opened every three months, or something like that.

In my letter appearing in December last (Vol. XLI., p. 290), I stated that "on the authority of Prof. Vernon Harcourt it is said that the Cooper process retains five-sixths of the total quantity of the sulphur present, leaving only one-sixth to be recovered in the oxide purifier." The Professor has since pointed out to me that this was simply a computation made by him, based upon the claim that one per cent. of air admitted to the purifier was sufficient. "I think," he said, "that I am only responsible for the bit of chemical arithmetic."

I notice that one or two local authorities are going in for lighting the public lamps with oil in preference to gas. It is rather remarkable that this should be so, seeing it has been proved, over and over again, that oil lamps are not efficient, though cheaper than gas if the price of the latter is high. The real object is to bring some opposition to bear against the gas company, and it frequently arises from matters of a personal nature. This is very evident in the case of Slough, where complaint has been made as to the quality of the gas supplied; in which town it was stated, at a meeting of the Urban Sanitary authority, that the oil lamps appeared to give a good and steady light, sufficient for the purpose in view; and at the same meeting the surveyor stated, without contradiction, that the oil lamps were not so good as gas. The fact that gas remains the only efficient and reliable agent for street lighting cannot be gainsaid, and the Slough authorities will find that although they may possibly get along for a time with oil or electricity, it will only be—as was the case at Wimbledon, Winchester, Chesterfield, Poole, Dawlish, and many other places—at the expense of public comfort and convenience, if not safety. I do not say this for the purpose of encouraging gas companies to assume a high hand with local boards; for it cannot be otherwise than unfortunate in many ways to the former if a disagreement springs up between them and their customers. A liberal policy in regard to the public lighting is the best in the end.

The Use of Sulphate of Ammonia as Manure.

Mr. William Arnold, the Chairman of the Tamworth Gas Company (and who is also one of the Surveyors and Umpires of the Railway Department of the Board of Trade), has forwarded the following remarks upon the use of sulphate of ammonia as a manure, with general directions for its use, and the crops for which it is most suitable:

"Sulphate of ammonia is one of the most powerful fertilizers known to modern science. It is especially rich in nitrogen; and when used either by itself or in conjunction with farmyard manure its good effects are written so plainly, in better quality and largely increased yield of corn, that no farmer who has once used it will ever give it up, but will, on the contrary, annually increase its use upon his farm.

"When bought at first hand from a gas works sulphate of ammonia is guaranteed to contain more than *twenty per cent. of nitrogen*. Hence its excellent effect upon all corn crops, which is chiefly expended in increasing the yield of grain, but not the straw; and there is, therefore, much less risk of 'lodging' from heavy rains. This is a very important advantage. Then manure rich in nitrogen increases the proportion of gluten in cereals; and this increase is stated by Boussingault to be as much as 10 per cent. With an increase, therefore, of 10 per cent. in quality and of 20 per cent. in yield, the use of sulphate of ammonia ought to be increased tenfold, to the great advantage of the English farmer, for both may be done.

"The most suitable dressing is one of from 2 to 3 cwt. per acre, mixed with an equal weight of fine dry earth or sand, and applied early in the spring (say March or April), in moist or showery weather. It should be thoroughly mixed in a barn or dry shed, and, if at all lumpy, beaten with a shovel and passed through a 45-mesh riddle. It should be carefully sown by hand, or, if in large quantities, with a manure drill. If wheat is to be grown entirely with sulphate of ammonia, it is best to put it on in two dressings—one half in autumn and the other half in spring.

"Upland or meadow grass, wheat, barley, oats, rye, colza, hemp, mangel-wurzel, cabbages, hops, garden produce generally, and beetroot (when grown for sugar), are the crops most largely benefited by this manure; simply because nitrogen, which is its dominant element, enters largely into their composition. For instance, colza, hemp, and beetroot, require each of them 70 pounds per acre of nitrogen to produce a full and healthy crop; wheat, 53 pounds; and barley, oats, and rye, 35 pounds per acre each.

"Beans, peas, sainfoin, or clover, in which potash is the dominant element, are not benefited by an application of sulphate of ammonia; but almost all other crops that can be grown will richly repay its use.

"In the case of a crop thinned out by wire worm, the ravages of birds or insects, or by a severe winter, the application of 2 cwt. of sulphate of ammonia early in the spring, and lightly harrowed in, will, in many cases, cause a crop that looked only fit to plough up to tiller freely, and grow away into a full yield of corn for the district."

When sending his communication (given above) Mr. Arnold wrote: "For many years I have bought sulphate of ammonia and other chemical manures from the manufacturers, and have *mixed them carefully myself at home*, with the result that I have saved about 33 per cent. in cost, and probably in many cases 20 to 25 per cent. in freedom from adulteration; and, in addition, the heavy commissions paid by manure manufacturers to agents. Even with the best of manure manufacturers, the scale of profit is so heavy that, for a manure costing the farmers, say, from £7 to £8 per ton, I do not think he obtains more than from £3 to £4 per ton manurial value. There is evidently a wide field here for the farmer to buy at first hand, and mix himself; or for co-operative farmers' associations to do so, and supply on much better terms, and to far greater advantage than now generally obtains."—*London Journal of Gas Lighting.*

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Gas Rates at Beaver Falls, Pa.—Mr. J. M. Critchlow, Superintendent of the Beaver Falls Gas Company, has kindly furnished us the following list of rates charged for gas in that city; all figures apply to monthly consumption in thousand feet: 100 to 900 feet, $1.80, with discount of 10 per cent.; 1,000 to 4,900, $1.50, discount 10 per cent.; 5,000 to 9,900, $1.50, discount 12½ per cent.; 10,000 to 24,900, $1.50, discount 16⅔ per cent.; 25,000 to 49,900, $1.50, discount 20 per cent.; 50,000 to 100,000, $1.50, discount 25 per cent.; 100,000 to 200,000, $1.50, discount 33⅓ per cent.; 200,000 and over, $1.50, discount 40 per cent. Discounts apply only in cases where accounts are settled between third and tenth days of month in which bills are presented. It will be noted that the average consumer obtains his supply of gas at a very reasonable rate. Critchlow is an enterprising manager.

Personal.—Mr. T. A. Bates, Superintendent of the Los Angeles (Cal.) Gas Light Company, has tendered his resignation of that position, and will sever relations with the company on August 1st. Bardstown, Nelson County, Ky., will in all likelihood be his future address.

Of Interest to Contractors.—Judging from the character of the advertisements that have recently appeared in some of the Western newspapers, Waco, Texas, is desirous of erecting a new gas works. The advertisements call for bids for the construction of a plant equal to the requirements of a population of 15,000. It is stated that the city will need about 75 street lamps—rather a meager allotment, it would seem, considering the number of inhabitants. "T. L. Smith, Chairman, Gas Works," should be applied to—at least, so the advertisers put it.

We do not Charge Them for This.—While the "National Gas Light and Fuel Company," with headquarters at Chicago, Ills. (and undoubtedly desirous of establishing outposts wherever they can secure a foothold), do not advertise in the columns of the Journal—indeed, it is more than likely that they never will—we cheerfully accord them the following dishonorable

mention: Acting after the manner of another celebrated "Company," they are mailing to all points a very neatly arranged circular letter—one of the typewriter sort—describing the peculiar merits, beauties, and ultra-efficiency of the Springer system of gas manufacture. Of course these worthies adhere closely to the truth—that is, they would not stray from the path of honest statement any further than to say that "two-thirds of the city of Chicago are now lighted by gas made with this system." An elegantly compiled sentence; and so strikingly truthful! Perhaps Messrs. Watkins and Forstall have shut down the retort houses of the Chicago Gas Light and Coke Company. Still, we rather guess not. It has been reported that some short while since an attempt was made to effect one grand combination between "all sorts and conditions" of the water gas speculators, and that the scheme fell through. What a prize menagerie that collection would make!

Our Alert Health Board.—The Health Commissioners of New York city, with that great regard for the public good which has always characterized their action, have notified the Directors of the Consolidated Gas Company that "deodorizers" must be placed in the stations of the Metropolitan and Knickerbocker plants, and have forbidden them to cart foul lime through the streets. Such material must hereafter be taken away in boats. We believe the Harlem station was also included in the notification, and not a foot of gas has been manufactured there for months. Sharp people, those Health Commissioners of ours. The managers of the Equitable Company were also directed "to abate the fouled lime nuisance."

Cheaper Gas for Altoona, Pa.—Mr. T. W. Cole, Superintendent of the Altoona Gas Company, writes us that on July 1st the price of gas in that city was reduced to $1.60. We believe this means a reduction of 15 cents per thousand. Altoona is a growing place, and the gas works is a credit to the city.

Shutting Down Gas Works.—Mr. Daniel Leach, of Fulton, Mo., writes us, under date of July 15, that the gas works located at Fulton, for the supply of light to the buildings known as the "Deaf and Dumb Institution" and "Insane Asylum No. 1," are about to be shut down, in consequence of the fact that the managers of both establishments have decided to employ electricity hereafter as the lighting agent. The arrangement made authorizes the United States Electric Light Company to furnish plant and power for the maintenance of 500 sixteen-candle power burners at the Insane Asylum; while the Edison Company is to operate 326 burners, of similar candle power, at the Deaf and Dumb Institution. Wires are now being laid on in both buildings. The gas works was the common property of both institutions, and it is hard to arrive at a reason explanatory of the change, unless possibly the gas plant required the expenditure of considerable money in the line of betterments, etc. Even then the sagacity or economy of the new departure would seem more than questionable.

They Did Not Shut Down.—In the "item" referring to the statements conveyed by the "Springer circular" as to the "fact" that two-thirds of the gas made in Chicago was manufactured under the "Springer process," it was hinted that Mr. Forstall might have shut down the old Chicago works—the hint being advanced so as to save the Springer manipulators from the charge of untruthfulness. But it is of no avail; their Ananias-like reputation is more than ever sustained in view of late information forwarded us by the genial Mr. S. S. Townsend, of New York city. Mr. T. writes us that Messrs. P. H. & F. M. Roots, of Connersville, Ind., are constructing one of their largest size (No. 6) gas exhausters, with engine on bedplate, for the Chicago Gas Light and Coke Company. Could it be possible that the Springer typewriter is at fault; or that the indicter of the circular letter meant to say that the Springer folks would like to furnish two-thirds of the city of Chicago with gas? Mature reflection inclines us to believe that this also is a wrong view, since did he make an attempt at telling what they would "like" to do the entire supply of the Lake City would just about satiate his and their ambition.

Putting it in Plain Terms.—The following circular, issued under date of July 10th, and headed, "How to Reduce Your Gas Bill," was handed to the consumers of the Fairfield (Ia.) Gas Works, by direction of Superintendent F. E. McMillin. We think the managers of small plants throughout the country will at once grasp the point contained without any further comment:

"While gas is cheaper now in Fairfield than in most other towns with same population in this State, it is possible to have the price still further reduced. The gas works can make no money at present price of gas; you cannot afford to pay a higher price. We know of but one expedient to remedy this that may be tried with any hope of success—a reduction in rates granted on account of increased consumption. We do not sell enough gas; we should have double the number of consumers we now have. In some towns a single consumer will burn more gas than is burned by all our consumers. That is the case in some of the small towns of our State. Will you not assist us in trying to increase our output? Talk to your neighbor; perhaps he is almost persuaded now, and a few words from you will induce him to adopt gas for lighting his premises. We make the following proposition:

"If we can obtain 20 additional consumers on or before the 15th of September, the price of gas will be $2.80 per 1,000 feet on and after the first of October—the discount remaining the same as heretofore. We further agree to make an additional reduction of ten cents per thousand feet for each additional ten new consumers, until the gross price shall be reduced to $2.40, and net price for largest consumption to $1.90. With us this will be an experiment. The new consumers may not burn enough to justify the reduction. With you it is a certainty. If the consumers are secured you get cheap gas whether it pays us or not." Looking at it from this distance, we are inclined to assert that the experiment is a pretty safe one to venture upon. We expect that Mr. McMillin will write us to that effect next fall.

Projected Opposition at Albany, N. Y.—Articles of incorporation for a new gas company at Albany, N. Y., were filed with the Albany County Clerk, on date of July 13th. The incorporators are E. C. Benedict and A. L. Farr, New York city, and E. Murphy, jr., of Troy, N. Y. Capital stock is placed at $700,000, divided into 7,000 shares, par value being $100. An "improved" method of gas manufacture is to be employed. Mr. Battin may be counted upon to take care of these parties in proper style; and if blackmail pure and simple is at the bottom of their scheme they had better stop at once.

Promoted.—At a regular meeting of Board of Directors of the Metropolitan (Brooklyn, N. Y.) Gas Light Company, held Tuesday, July 14th, Mr. Chas. H. Stoddard was elected to the presidency of that corporation, succeeding Mr. John Williams, resigned. The choice is a good one, inasmuch as Mr. Stoddard had occupied the dual position of Secretary and Treasurer to the company for a number of years.

Awarded a Contract.—Mr. Adam Weber, proprietor of the Manhattan Fire Brick and Enamelled Clay Retort Works, New York city, is furnishing retorts and settings for 12 benches of "sixes," to the order of the Chesapeake Gas Light Company, of Baltimore, Md.

Cheaper Gas for Lawrence, Mass.—Mr. C. J. R. Humphreys, in charge of the Lawrence Gas Light Company, has notified his consumers that all ordinary consumption of gas will in future be charged for at the rate of $1.60 per thousand. Prior rate was $1.90; and the new scale went into effect on July 1st. Humphreys is an advocate of cheap gas, and of good gas, too. With his deft management of the tiller the stockholders of the Lawrence Company can always count upon "making port."

Baxter Beat Them.—Brother Wm. H. Baxter, of the Petersburg (Va.) Gas Light Company, has just been engaged in a "brush" with the would-be electrical promoters of his vicinity, and the returns show that he beat them. The electrical purveyors were anxious to secure a contract for lighting the streets, and made the usual promises concerning effectiveness, cheapness, etc. The Council was at first inclined to look with favor upon the scheme, but Baxter's arguments had such weight that the authorities finally concluded to make a contract with the Petersburg Gas Company, under the terms of which the streets and public buildings of the city are to be lit by gas for the next three years. Lamp posts are to be charged for at an annual price of $25 each, and gas supplied to public buildings is to cost $1.90 per thousand cubic feet. The new contract bears date of July 1st; and it is almost needless to add that the Petersburg gas folks are in "high feather."

The Circleville (Ohio) Gas Light Company Vanquishes the Electrical Promoters.—There has been a lively rumpus out in Circleville (between the local gas company and the local Edison electric lighting managers), and the first named participant therein has secured the honors—and a contract. At the Council meeting held July 15th the specifications to govern bids for street lighting for ensuing year were presented and adopted. The specifications (the arrangement of which had been known for some time) were decidedly favorable to the electric lighting promoters; indeed their provisions were such as to make the Edison men feel quite confident that the gas company would be unable to make any showing at all. As an instance, 9 lamps were required to be located in out-of-the-way places, and in such situations the Council forbade the maintaining of oil lamps, although oil lamps could be employed in other parts of the city. These 9 lamps entailed the laying of about one-half a mile of extra main; and it was also specified that all lamps should be lighted and extinguished at the *exact time* named in the agreement. In several minor ways it was also sought to harass the gas company, and the electric folks had the thing down so fine as to lead them to suppose that no competitive bid would be offered against them.

Here it may be incidentally remarked, on behalf of the Edison promoters, as a reason for their strenuous efforts to obtain the street lighting at Circleville, that they were in great financial straits, hence their activity—it appears really to have been a case of "contract or death." The electricians called to their aid reinforcements of persuaders from Cincinnati; and the special services of "Mister" Fitch, of Louisville (Ky.) water gas fame—by-the-way, Barret ought to be making things hot enough for Fitch to keep him at home—were also enlisted. They made all sorts of propositions to Mrs. Moore (the widow of Mr. E. D. Moore, former proprietor of the Circleville Gas Company) in the attempt to prevent her from making a bid on the lighting; but Mrs. M. was "in the fight to stay." Fitch, we believe, went so far as to make the claim that he (or his backers) had leased the Circleville works before her husband died, and absolutely forbade her from entering into the competition. He might as well have saved himself all bother in the premises; and, in passing, attention might be called to the close bond of sympathy that seems to exist between the water gas gentry and the electric lighting speculators in more than one section of the country. Mrs. Moore, after consultation with Mr. Emerson McMillin, of Columbus, Ohio, decided upon the action to be taken; and, in accordance therewith, through her agent, at the Council meeting spoken of above, submitted the figures at which the Circleville Gas Company would agree to perform the required lighting service. Below is given the aggregate bid price of the two competitors for the different contract periods. The gas company's bid is for the lighting of 135 lamps, while that of the electric company is based on the furnishing of 99 lights, *equal to* 135 *lights of* 16-*candle power each:*

	Gas Company.	Electric Company.
For one year.....	$1,344.60	$2,000
For two years.....	3,020.10	4,995
For three "	4,634.55	7,695
For four "	6,208.65	10,530
For five "	7,558.65	13,500

The bids were based on a certain specified moon-table.

To say that Fitch's partners were surprised at this state of affairs but very faintly describes "their state of mind;" and before they could recover a proper mental balance Councilman Salters moved that the City Solicitor be instructed to draw up a formal contract, in accordance with bid and specifications, between the city and gas company, binding the parties thereto for the term of five years. The motion was carried. The gas company also made a proposition in which it agreed to light the lamps all night and every night in the year during five years for a total sum of $9,112—or at the rate of $13.50 per post. It is possible that when the Council is called upon to finally ratify the instrument drawn up by solicitor the latter proposition may be substituted for the former. Should the city do its own lighting and extinguishing, the gas company will make a reduction of $480 per year from its bid. Well done, Mrs. Moore!

Fatal Accident.—On the afternoon of Tuesday, July 14, a fatal accident occurred at the premises on which a new holder is being erected to the order of the Albany (N. Y) Gas Light Company. The disaster was occasioned by the "kicking" of a derrick. The victims were Joseph Pernett (who had for years been in the employ of Messrs. R. D. Wood & Co., proprietors of the Camden Iron Works, Phila., Pa.), Michael Roach, and William McCarty, both of Albany.

Carbonic Oxide was the Cause.—The New York *Daily Tribune*, date of July 4, contained the following: "A beardless young man entered the Richmond Hotel, No. 34 East Twelfth street, about 9 A.M. yesterday, and inquired for his sister, whom he had taken to the hotel late on the previous night. Being told that she had not left her room, he went upstairs with a porter to call her. At the door of the room a strong odor of gas was noticed, and repeated knocks failed to elicit any response. When the door was broken open Miss Kennedy was found dead in bed. She had been suffocated in her sleep by the gas emitted from a turned-on burner. She had arrived in the city on the 2d of July, and intended journeying to Philadelphia on the 3d, there to pay a visit to her aunt. She had been in vigorous health." Vigorous health never stays the death dealing power of CO.

Nothing New in the Dunbar Case.—Up to our present advices the murderer of Mr. Geo. S. Dunbar, of Pittsfield, Mass., still remains undiscovered. The intimation is made that deceased committed suicide, but not the slightest evidence tending to prove the assertion has as yet been offered. The police have a most unpleasantly ready style of making such a charge. It may save them trouble, and they do not appear in any way concerned about the fact that such an imputation serves but to throw a cloud of shame over the memory of the dead. Mr. Dunbar was undoubtedly the victim of an assassin.

Cheaper Gas for Nashua, N. H.—On more than one occasion it has been our pleasant duty to bear witness in these columns to the business tact and cleverness of the gentlemen in charge of the Nashua Gas Light Company; and here they come with another sample or instance of how the thing should be done. Superintendent A. M. Norton (the gas man that was made a Mayor) is probably responsible for the policy pursued in the past, and more than likely is to be charged with the latest announcement that from and after October 1st, 1885, the Nashua gas consumer will obtain his supply at the figure of $1.60 per thousand cubic feet. In 1873 the yearly output of the Nashua Company was, in round numbers, 7½ millions; in 1885 the total send-out may be put at 18 millions. In 1873 $3.80 per thousand cubic feet was the selling price; 1885 will see it at $1.60. Among other things, when dealing with the reduced gas rate, the Nashua *Daily Telegraph* says: "Good, square, liberal management like that illustrated in the case of the Nashua Gas Light Company has more than a local value; it is an example that shines like a light on the hill-top, and furnishes both a light and a hint to other corporate interests that deal with the public." Who knows but that they might yet send Norton to Congress?

Appointing a Massachusetts Board of Gas Commissioners.—The Hon. H. B. Pierce, Secretary of the Commonwealth of Massachusetts, gave notice that the Governor, on date of July 16, with advice and consent of the Council, had named the following gentlemen to serve on and compose a board of gas commissioners: Messrs. Starkes Whiton, of Hingham; Edward T. Rowell, of Lowell; and F. E. Barker, of Worcester. Mr. Walter S. Allen, of New Bedford, was named to serve as clerk to the board. These appointments are favorably commented upon.

An Amusing Interview.—A reporter of the Chicago *Inter Ocean* recently interviewed a certain Mr. C. R. Cummings, said to be a large holder of the bonds of the Consumers Company of that city, in regard to the bad financial outlook for that corporation. Mr. Cummings was in a decidedly chatty vein, and his remarks are quite amusing. In answer to the question as to why it was that gas sold at such a low price in Chicago, Mr. C. responded: "When the Consumers Company was organized and commenced doing business the old company was charging $2 and $2.50 per 1,000. It at once made the price $1, and of course the new company could not expect to do very much business at a higher rate. I hear it stated that the old company has lost over one million dollars in its attempt to destroy the new company, and yet the plant of the new company remains, and when the new company is reorganized it will be in position to carry on the war, if necessary, indefinitely." Now comes the little joker—just merely thrown out as a suggestion of the reporter's. "Only that, and nothing more." Reporter—"Would it be possible for the old company to get possession of the new one; and what would be the result if it should?" Cummings—"It has just as much right as anyone else to purchase the securities, and if I were the old company, and could get control, I would not sell gas for $1 per 1,000 very long." Mr. Cummings admits that the new company's plant is still there, but seems to forget that the old Chicago plant is yet growing. President Watkins knows enough about agriculture to understand that too much water is a bad thing; and as Mr. Cummings is one of the later-day bondholders in the Consumers Company, he has probably found out by this time that the famous Chicago Construction Company of four years ago had an extra supply of watering-pots in its tool chests. The watering-pots were not always kept in the tool chests, though; many an active hour's duty they saw. [Since the above was written we have received information that Mr. Judson, President of the Consumers Company, was recently appointed its receiver.]

Another Death.—A telegram from Cape May, N. J., dated July 11, conveys the news that Mr. Otto Fridberg, a member of the firm of Fridberg & Adler, doing business at 92 Reade street, New York city, was found dead in his bed at the new Columbia Hotel, on the night of July 10th. Death ensued from the inhalation of illuminating gas that had escaped through a turned-on burner. The key to gas burner was defective.

Determining the Increase of the Earth's Temperature Toward Its Interior.—According to the London *Times* the German Government is sinking a deep shaft near Schladebach, with the especial object of obtaining trustworthy data concerning the rate of increase of the earth's temperature toward the interior. At the beginning of this year the shaft had reached the depth of 1,392 meters. The temperature at successive stages is ascertained by a special thermometer, the principle of construction being that as the heat increases the mercury will expand so as to flow over the lip of an open tube. The difference of the overflows will give the rate of increase in temperature. At the depth of 1,392 meters the temperature was shown to be 49° C., or 120° F. Should this ratio of increase be maintained the boiling point of water ought to be reached at a depth of 3,000 meters, and at 75 kilometers (46+ U. S. miles) we should find the heat at which platinum melts. This would go to show that the earth's crust cannot be more than about one-ninetieth of its radius.

THE AMERICAN GAS LIGHT JOURNAL

MONDAY, AUGUST 3, 1885.

The Market for Gas Securities.

The market for city gas shares presents no special change, save in the case of Mutual. This security is decidedly stronger. Those in charge of the Equitable manipulation predict higher prices for their pet parchment. No doubt they can secure this result—they can move it up or down at their own sweet will. Consolidated gas shows no variation, and it may be noted that the market is almost lifeless, so far as actual business transactions are concerned. The brokers are complaining about the extreme dullness of the situation; but let them possess their souls in patience, the back end of October will see them busy enough.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,

16 Wall St., New York City.

August 3.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share. ☜

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	94	95
Central	440,000	50	60	70
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	136	140
" Bonds	1,000,000	—	107	110
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	113
Mutual	3,500,000	100	135	137x
" Bonds	1,500,000	1000	104	107
Municipal, Bonds	750,000		—	—
Northern	125,000	50	50	—
" Scrip	108,000			
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	129	131
Citizens	1,200,000	20	86	88
" S. F. Bonds	320,000	1000	106	110
Fulton Municipal	3,000,000	100	158	160x
" Bonds	300,000		104	108
Peoples	1,000,000	10	85	87
" Bonds	290,000	—	105	110
" "	250,000	—	90	95
Metropolitan	1,000,000	100	94	96
Nassau	1,000,000	25	125	127x
" Ctfs	700,000	1000	98	99
Williamsburgh	1,000,000	50	151	153
" Bonds	1,000,000	—	111	114
Richmond Co., S. I.	300,000	50	64	75
" Bonds	40,000	—	—	—
Out of Town Gas Companies.				
Buffalo Mutual, N. Y.	750,000	100	80	85
" Bonds	200,000	1000	95	100
Citizens, Newark	918,000	50	103	115
" " Bonds	124,000	—	105	110
Chicago Gas Co., Ills	5,000,0000	25	128	132
Peoples G. L. & C. Co., Chicago, Ills			8	12
Cincinnati G. & C. Co.			180	182
Consolidated, Balt.	6,000,000	100	42	43
" Bonds	3,600,000		107	107½
Central, S. F., Cal.			—	58
Capital, Sacramento, Cal.			56	—
Hartford, Conn	750,000	25	123	129
Jersey City	750,000	20	145	—
Laclede, St. Louis, Mo.	1,600,000	100	100	105
Louisville, Ky	1,500,000	50	95	100
Montreal, Canada	2,000,000	100	181	182½
New Haven, Conn		25	166	170
Oakland, Cal			29	30

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Used by most of the Gas Companies of the United States with perfect satisfaction. Manufactured by

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Two Smith & Sayre (12-inch) Steam-Jet Exhausters, with **3 Self-acting Bye-Passes.**

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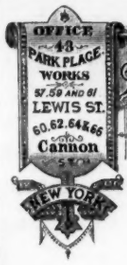

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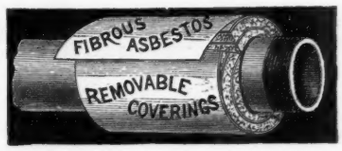

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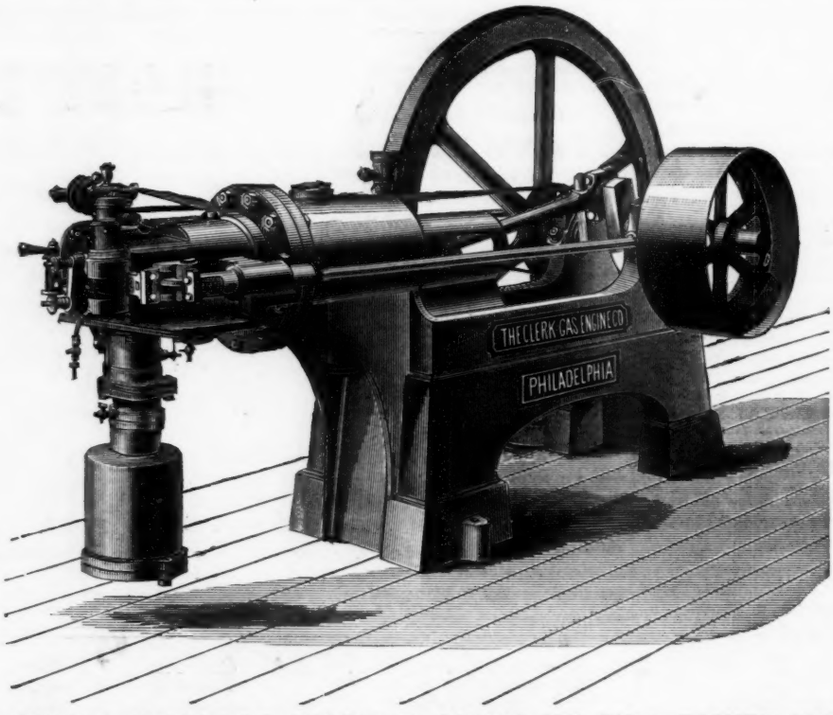

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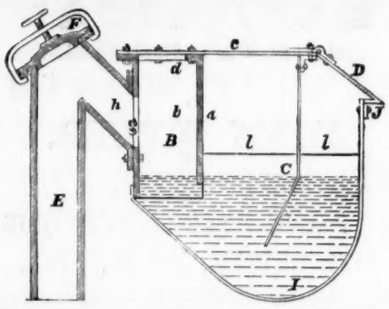

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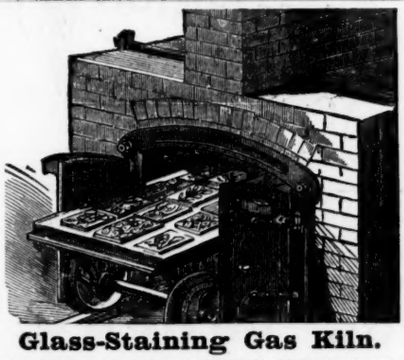

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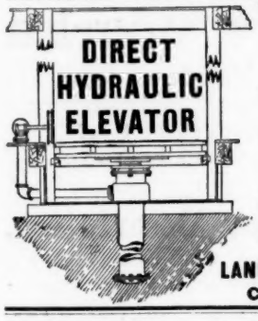

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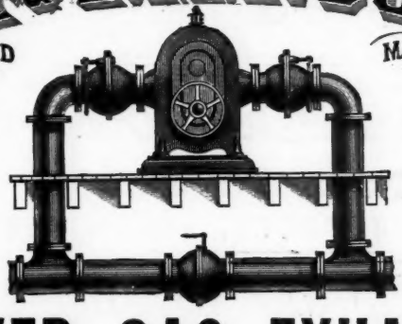

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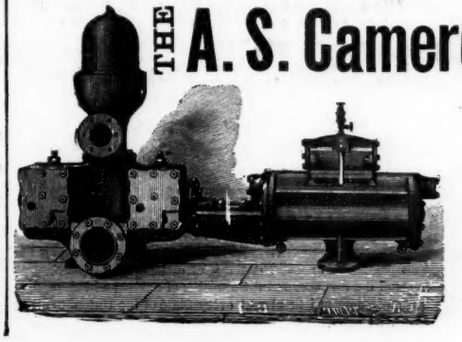

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Clay Retorts, Blocks & Tiles,
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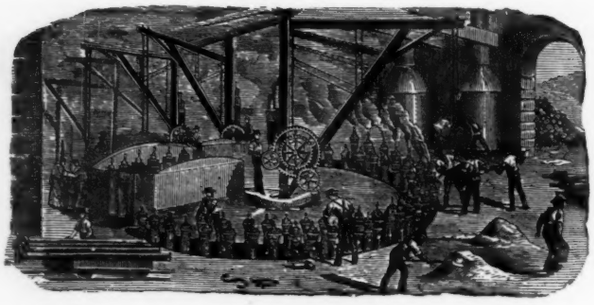

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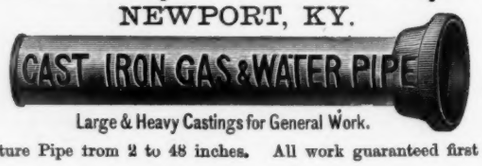

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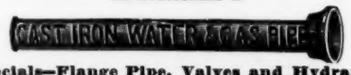

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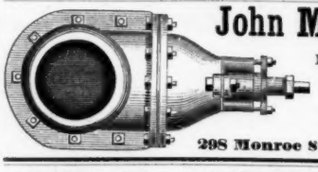

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Silica Dinas Fire Brick & Cement.

Unrivaled for Endurance Under Intense Heat. Percentage of Silica, 95.64.

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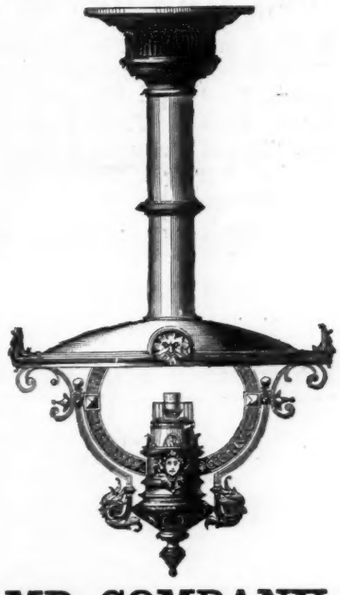

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1877	4,000,000 cubic feet.
1878	4,750,000 "
1879	24,545,000 "
1880	42,967,500 "
1881	36,462,500 "
1882	39,300,000 "
1883	57,735,000 "
1884	26,177,500 "
Total	235,937,500 cubic feet.

Total Number and Capacity per 24 Hours of "Standard" Washers Erected and in Course of Erection in the Several Countries

	Number.	Cubic Feet per Day.
Great Britain	151	157,070,000
Western Hemisphere	38	39,337,500
Australia	18	12,150,000
New Zealand	2	650,000
France	6	4,550,000
Belgium	8	5,420,000
Germany	16	8,200,000
Holland	4	4,160,000
Denmark	1	150,000
Russia	2	3,500,000
Spain	1	350,000
India	1	400,000
Total	248	235,937,500

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GEO. SHEPARD PAGE, Esq., New York:

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Yours, etc.,
A. B. SLATER, Treasurer.

PORTLAND GAS COMPANY. PORTLAND, ORE., Nov. 29, 1884.

GEO. SHEPERD PAGE, New York:

Dear Sir—Our Scrubber appears to run to our entire satisfaction, and we are pleased to say that it takes out all the ammonia from the gas. This is *very* satisfactory to us, as we were ruining our meters at a fearful rate heretofore. The amount of water used is very inconsiderable as compared with our old process. The machine runs very smooth and still. Very respectfully,

H. C. LEONARD, Secretary.

"Standard" Washers Ordered Recently.

	Cu. Ft. per Day
Anneberg Gas Co	200,000
Bombay Gas Co	400,000
Brussels Co	1,250,000
CHICAGO, two, 1,000,000 each	2,000,000
Chemnitz Gas Co	1,000,000
CITIZENS GAS CO., BUFFALO	750,000
Coke Works in Zabre, Ober-Schlesien	1,500,000
Cokerei der Friedenshutte, Upper Silesia	500,000
Dumfries Corporation	250,000
Dunedin Gas Co., New Zealand	400,000
GEORGETOWN, D. C	250,000
King's Lynn Gas Co	300,000
Leiden, Holland	600,000
Lincoln Gas Co	400,000
Liverpool Gas Co	2,000,000
" "	3,000,000
LOUISVILLE GAS CO	1,500,000
Numea Gas Co	100,000
PITTSBURGH GAS CO	1,500,000
PAWTUCKET, R. I	500,000
PORTLAND GAS CO., Oregon	562,500
SAN FRANCISCO GAS CO	4,000,000
Sheepbridge	40,000
ST. LOUIS GAS CO	2,000,000
Sydney Gas Co	2,500,000
WASHINGTON, D. C. GAS CO	2,000,000
Whitchurch Gas Co	175,000
Total	29,677,500

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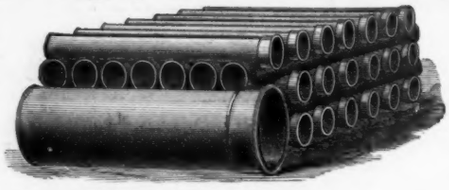

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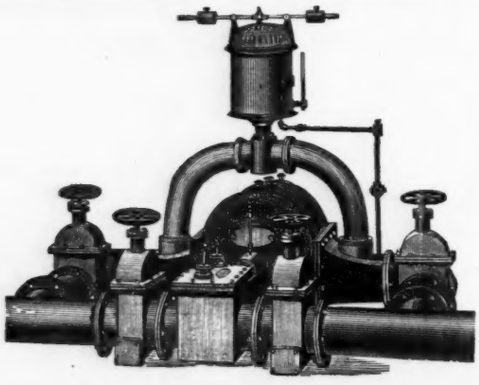

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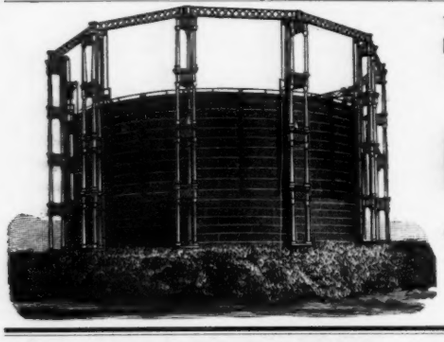

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Youngstown, Ohio	"	60,000	"
Canton, "	"	60,000	"
Akron, "	"	80,000	"
Xenia, "	"	10,000	"
Adrian, Mich	"	65,000	"
Ypsilanti, Mich	"	25,000	"
Muskegon, "	"	70,000	"
South Bend, Ind	"	70,000	"
Anderson, "	"	20,000	"
Plainfield, "	"	10,000	"
Springfield, Illinois	"	100,000	"
Evanston, "	"	50,000	"
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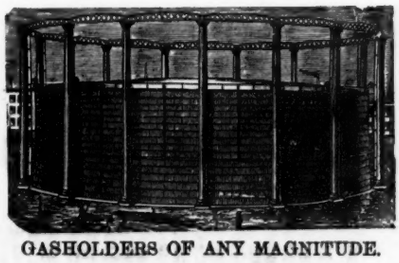

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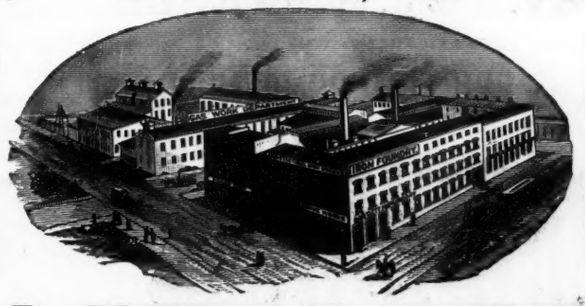

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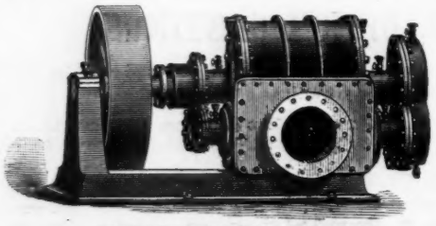

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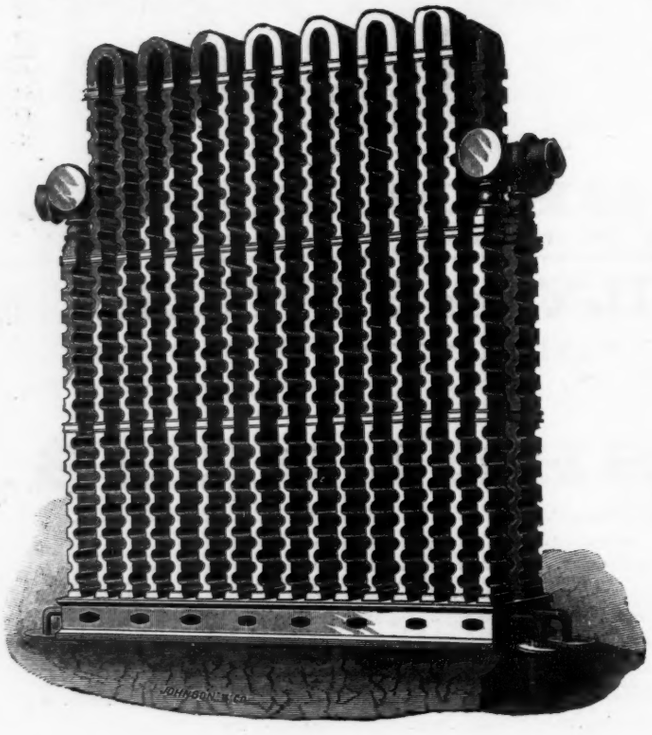

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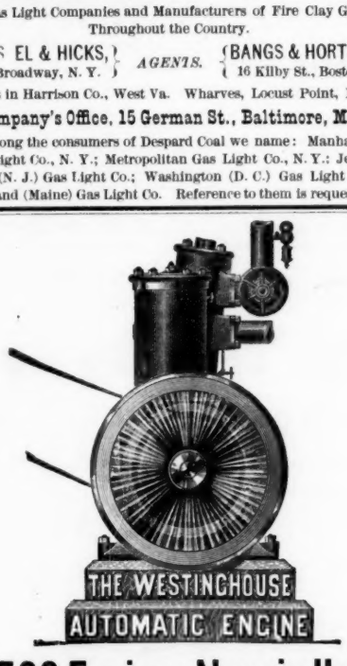

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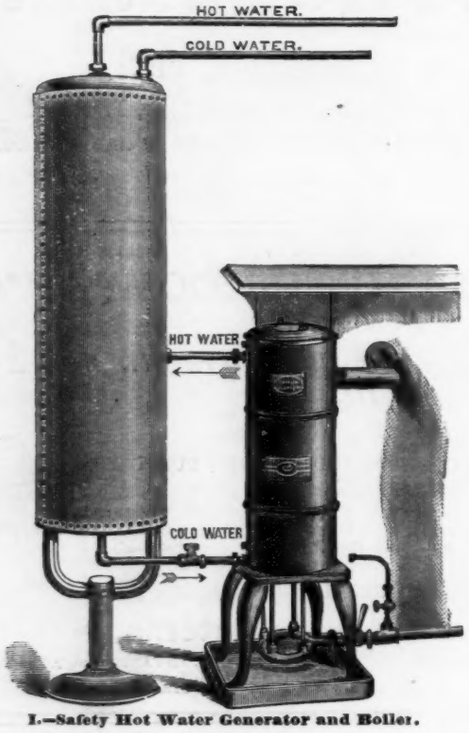

I.—Safety Hot Water Generator and Boiler.

II.—Gas Cooking Stove No. 8 B.

Safety Hot Water Generator and Boiler.

Cut I. represents our Safety Gas Hot Water Generator and Boiler, arranged for home use. This most easy, quick, and economical way of preparing a warm bath, or for heating water for any domestic purpose, entirely supersedes any necessity for the use of ranges or stoves—a great comfort, particularly in hot weather. The boiler being self-filling, as the hot water is drawn off, can never become empty, thus preventing the possibility of any accident.

We beg to call attention to the cast iron pan which is now attached to the legs of the Generator (see illustration). This is to catch the drippings from the Coil, which many persons suppose come from a leak, when in fact they are produced by condensation. This condensation is caused by the hot flame coming in contact with the coil filed with cold water.

New Style Gas Cooking Stove.

Cut II. represents our New Style Cooking Stove. As will be seen, it has an ornamented cast iron base and front, and extension shelves. The oven burner, which is atmospheric (unless otherwise ordered), is of an entirely new and improved pattern (patent applied for). The ovens are of greater capacity than those of the old style. The top, in conjunction with the outlet pipe, is designed to carry off all products of combustion; hence the outlet pipe must be connected with a flue, or the stove will not work properly.

This Stove has 4 boiling burners in top of hot plate. All fittings are nickel plated. We are making this style of Cooking Stove in the following sizes—viz., No. 7 B, No. 8 B, No. 9 B, and No. 10 B.

III.—Improved Hot Plate, No. 108.

New Style Hot Plates.

Cut III. represents our New Style of Hot Plates, of which we are making No. 106 (two small boiling burners), No. 107 (two medium sized boiling burners), and No. 109 (two medium and one large boiling burner). See new Catalogue and Price List for further particulars.